Endocarditis in the elderly

Gilbert Habib
Département de Cardiologie - Timone – Marseille

Eurovalves Barcelona 2017
Endocarditis in the octogenarian

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Eurovalves Barcelona 2017
Case 1: TAVI endocarditis

- 80 year-old man
- CHF
- TAVI 2 years ago
- fever = 38°
- BC: staphylococcus coagulase -
Multimodality Imaging

CT scan: positive

Doubtful PET CT
Patient 2: TAVI endocarditis

May, 27th 2016
- 83 year-old man
- streptococcus salivarius IE
- 6 months after Edwards Sapien 3 implantation
- TEE: thickening of THV leaflets
- MSCT: leaflets thickening and vegetation
- PET/CT showed the THV $^{18}$F-FDG uptake

May, 28th 2016
Patient 2: TAVI endocarditis

- 83 year-old man
- streptococcus salivarius IE
- 6 months after Edwards Sapien 3 implantation
- TEE: thickening of THV leaflets
- MSCT: leaflets thickening and vegetation
- PET/CT showed the THV $^{18}$F-FDG uptake
Panel D. A 84 year-old man with a *enterococcus faecalis* definite IE 8 months after a 26-mm Edwards Sapien 3 implantation. TEE showed an abscess on the external aortic root (white arrow, a, b and c) with a pseudoaneurysm near the THV stent (blue arrow, c) and a critical internal aortic periannular lesion with an aorto-right atrial fistulae (red arrows, a and b). MSCT confirmed all the lesions in d, e and f. PET/CT showed the THV $^{18}$F-FDG uptake (g).
Endocarditis in the elderly

- The proportion of elderly patients increases in infective endocarditis (IE)

- Clinical, echocardiographic, and prognostic features of IE vary among studies

- Some studies showed that IE in the elderly was associated with a worse prognosis and a higher incidence of complications

- Other authors found no difference in clinical presentation and outcome between younger and older patients
Incidence of endocarditis

All cases (n=497) of definite IE in 15 million inhabitants

Incidence 34 / million
Incidence of endocarditis

Incidence 34 / million

Incidence of TAVI endocarditis

Incidence 34 / million

194 / million

Incidence of TAVI endocarditis

Elderly in Euro Heart Survey

Tornos P – Heart 2005 ; 91 : 571-5

- Native: n = 118
- PVE: n = 41
- Total: n = 159

- Age > 70
- Age < 70
multicenter study (Paris, Marseille, Rouen, Naples)
315 infective endocarditis
228 M, age 57 ±17 years
definite by Duke criteria
TEE and BC in all
Endocarditis in octogenarians

- single center study (Marseille)
- 454 infective endocarditis

L Oliver, unpublished data

- <65 years: 230 cases, 51%
- 65-80 years: 173 cases, 38%
- >80 years: 51 cases, 11%
Endocarditis in the elderly

1. predisposing conditions and portal of entry
2. clinical and laboratory features
3. echocardiographic data
4. prognosis and treatment
Endocarditis in the elderly

1. *predisposing conditions and portal of entry*

2. clinical and laboratory features

3. echocardiographic data

4. prognosis and treatment
Portal of entry

- <65 years
- 65-80 years
- >80 years

- Dental: 25% (p=0.09), 19%, 16%
- Cutaneous: 35% (p=0.09), 24%, 27%
- Urinary: 0.5%, 9.8%, 9.1% (p < 0.001)
- Digestive: 20.7%, 30.8%, 38.6% (p=0.02)
Predisposing cardiac conditions

- high incidence of degenerative valve disease
  (Werner AJM 1996, Zamorano JASE 2002)

- frequent prosthetic and pacemaker IE
  (Selton-Suty Heart 1997)

- higher incidence of right heart IE in younger pts

- digestive portal of entry and *S. bovis* IE more frequent in elderly (Selton-Suty 1997)
Endocarditis localization

- P = 0.04

- P = 0.05

<table>
<thead>
<tr>
<th>Location</th>
<th>&lt;65 years</th>
<th>65-80 years</th>
<th>&gt;80 years</th>
</tr>
</thead>
<tbody>
<tr>
<td>mitral</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>aortic</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>right heart</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>prosthesis</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>PM</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
Microorganism involved

- S. bovis
- Other streptococci
- Staphylococcus
- Negative BC
- Enterococci

- <65 years
- 65-80 years
- >80 years

- p<.05
# Enterococcal endocarditis


## Table 1
Demographic characteristics and comorbid conditions of patients with left-sided native valve endocarditis due to enterococcus compared to non-enterococcus

<table>
<thead>
<tr>
<th>Characteristic</th>
<th>Enterococcus (n = 107)</th>
<th>Non-enterococcus (n = 1178)</th>
<th>P value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Number (%) or Mean ± SD</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Age (years)</td>
<td>66.4 ± 13.5</td>
<td>58.2 ± 16.5</td>
<td>&lt;0.0001</td>
</tr>
<tr>
<td>Sex (men)</td>
<td>78 (73%)</td>
<td>794 (67%)</td>
<td>0.24</td>
</tr>
<tr>
<td>Community acquired</td>
<td>46 (74%)</td>
<td>609 (84%)</td>
<td>0.05</td>
</tr>
<tr>
<td>Nosocomial</td>
<td>9 (15%)</td>
<td>64 (9%)</td>
<td>0.11</td>
</tr>
<tr>
<td>Chronic catheter</td>
<td>2 (4%)</td>
<td>43 (8%)</td>
<td>0.28</td>
</tr>
<tr>
<td>Cancer</td>
<td>13 (21%)</td>
<td>53 (8%)</td>
<td>0.0005</td>
</tr>
<tr>
<td>Diabetes</td>
<td>11 (18%)</td>
<td>87 (13%)</td>
<td>0.27</td>
</tr>
<tr>
<td>Chronic dialysis</td>
<td>4 (7%)</td>
<td>35 (5%)</td>
<td>0.66</td>
</tr>
<tr>
<td>Other chronic illness</td>
<td>12 (24%)</td>
<td>143 (27%)</td>
<td>0.57</td>
</tr>
<tr>
<td>Congenital heart disease</td>
<td>3 (4%)</td>
<td>119 (15%)</td>
<td>0.02</td>
</tr>
<tr>
<td>Mitral valve prolapse</td>
<td>1 (2%)</td>
<td>63 (9%)</td>
<td>0.05</td>
</tr>
</tbody>
</table>
Endocarditis in the elderly

1. predisposing conditions and portal of entry
2. clinical and laboratory features
3. echocardiographic data
4. prognosis and treatment
Clinical manifestations

- blunted febrile response

- atypical presentations (Terpening AJM 1987)
  - Fatigue, anorexia, weight loss
  - Neurologic symptoms
  - Rheumatologic complaints

- delayed diagnosis +++ (Zamorano JASE 2002)

- less frequent embolisms ? (Selton-Suty Heart 1997)
# Clinical and laboratory data

<table>
<thead>
<tr>
<th></th>
<th>&lt; 65 y (n = 230)</th>
<th>65-80 y (n = 173)</th>
<th>&gt; 80 y (n = 51)</th>
<th>p</th>
</tr>
</thead>
<tbody>
<tr>
<td>Fever</td>
<td>80 %</td>
<td>78 %</td>
<td>80 %</td>
<td>ns</td>
</tr>
<tr>
<td>New/changing murmur</td>
<td>67 %</td>
<td>59 %</td>
<td>58 %</td>
<td>ns</td>
</tr>
<tr>
<td>NYHA III-IV</td>
<td>42 %</td>
<td>45 %</td>
<td>50 %</td>
<td>ns</td>
</tr>
<tr>
<td>Hb</td>
<td>11</td>
<td>10</td>
<td>11</td>
<td>ns</td>
</tr>
<tr>
<td>Spondylitis</td>
<td>5 %</td>
<td>12 %</td>
<td>23 %</td>
<td>&lt; 0.001</td>
</tr>
<tr>
<td>New embolic events</td>
<td>9 %</td>
<td>15 %</td>
<td>21 %</td>
<td>0.03</td>
</tr>
<tr>
<td>Renal clearance</td>
<td>88</td>
<td>60</td>
<td>43</td>
<td>&lt; 0.001</td>
</tr>
<tr>
<td>Atrial fibrillation</td>
<td>8 %</td>
<td>35 %</td>
<td>43 %</td>
<td>&lt; 0.001</td>
</tr>
</tbody>
</table>
Endocarditis in the elderly

1. predisposing conditions and portal of entry
2. clinical and laboratory features
3. **echocardiographic data**
4. prognosis and treatment
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<th>Echocardiographic features</th>
<th>&lt; 65 y n = 230</th>
<th>65-80 y n = 173</th>
<th>&gt; 80 y n = 51</th>
<th>p</th>
</tr>
</thead>
<tbody>
<tr>
<td>Vegetation</td>
<td>75%</td>
<td>78%</td>
<td>78%</td>
<td>ns</td>
</tr>
<tr>
<td>Abscess</td>
<td>17%</td>
<td>23%</td>
<td>20%</td>
<td>ns</td>
</tr>
<tr>
<td>New prosthetic regurg.</td>
<td>8 (7%)</td>
<td>6 (4%)</td>
<td>2 (3%)</td>
<td>ns</td>
</tr>
<tr>
<td>Severe valve regurg.</td>
<td>53 (50%)</td>
<td>57 (43%)</td>
<td>32 (42%)</td>
<td>ns</td>
</tr>
<tr>
<td>Valvular perforation</td>
<td>42%</td>
<td>28%</td>
<td>35%</td>
<td>0.02</td>
</tr>
</tbody>
</table>
Multimodality imaging in IE

- **TEE**
  - Morphology

- **PET CT**
  - Inflammation / infection

- **Cardiac CT**
  - Perivalvular lesions
ESC 2015 algorithm for diagnosis of IE

Clinical suspicion of IE

Modified Duke criteria (Li)

Definite IE
Possible/rejected IE but high suspicion
Rejected IE Low suspicion

Native valve
Prosthetic valve

1 - Repeat echo (TTE + TOE)/microbiology
2 - Imaging for embolic events
3 - Cardiac CT

ESC 2015 modified diagnostic criteria

Definite IE
Possible IE
Rejected IE
TAVI endocarditis

Leaflets thickening

Obstructive pattern

Increased gradient

Definite IE

70%
80%

Multi-imaging approach

Modified Duke criteria
TEE
K = 0.21

ESC 2015 Modified criteria
MSCT
K = 0.66

PET/CT

* at admission compared with final expert diagnosis at 3 months of follow-up
Endocarditis in the elderly

1. predisposing conditions and portal of entry
2. clinical and laboratory features
3. echocardiographic data
4. *prognosis and treatment*
Prognosis and therapeutic options

- antibiotic nephrotoxicity
- less frequent surgery? \(\text{(Selton-Suty Heart 1997)}\)
- increased surgical risk? \(\text{(Netzer CID 1998)}\)
- worse prognosis? \(\text{(Terpening AJM 1987)}\)

**Influence of age on outcome?**
Morbidity

- Embolism under therapy:
  - <65 years: 9.2%
  - 65-80 years: 15%
  - >80 years: 21%

- Acute renal failure:
  - <65 years: 27%
  - 65-80 years: 32%
  - >80 years: 51%

Significance levels:
- Embolism: p=0.03
- Acute renal failure: p=0.004
## Predictors of 1-year mortality

384 patients (Marseille, Paris, Rouen, Napoli)

Factors associated with 1-year mortality

1-year mortality = 20.6 %

<table>
<thead>
<tr>
<th>Predictor</th>
<th>Adjusted RR</th>
<th>95% CI</th>
<th>P</th>
</tr>
</thead>
<tbody>
<tr>
<td>Age</td>
<td>1.02</td>
<td>1.01–1.04</td>
<td>0.007</td>
</tr>
<tr>
<td>Female sex</td>
<td>1.6</td>
<td>1.01–2.58</td>
<td>0.048</td>
</tr>
<tr>
<td>Comorbidity index &gt;2</td>
<td>1.6</td>
<td>0.92–2.64</td>
<td>0.1</td>
</tr>
<tr>
<td>Serum creatinine &gt;2 mg/L</td>
<td>1.9</td>
<td>1.16–3.23</td>
<td>0.01</td>
</tr>
<tr>
<td>Prosthetic valve</td>
<td>1.6</td>
<td>0.99–2.68</td>
<td>0.053</td>
</tr>
<tr>
<td><em>S aureus</em> IE</td>
<td>2</td>
<td>1.19–3.24</td>
<td>0.001</td>
</tr>
<tr>
<td>Moderate or severe CHF</td>
<td>1.6</td>
<td>1.02–1.54</td>
<td>0.04</td>
</tr>
<tr>
<td>Vegetation length &gt;15 mm</td>
<td>1.8</td>
<td>1.10–2.82</td>
<td>0.02</td>
</tr>
</tbody>
</table>
## Mortality in elderly patients with IE

<table>
<thead>
<tr>
<th>Author</th>
<th>total (n)</th>
<th>age (y)</th>
<th>elderly (n)</th>
<th>surgery (%)</th>
<th>in-hospital mortality (%)</th>
<th>long-term mortality</th>
</tr>
</thead>
<tbody>
<tr>
<td>Selton-Suty</td>
<td>114</td>
<td>&gt;70</td>
<td>25</td>
<td>24</td>
<td>28</td>
<td></td>
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<tr>
<td>Netzer</td>
<td>135</td>
<td>&gt;70</td>
<td>20</td>
<td>65</td>
<td>25</td>
<td></td>
</tr>
<tr>
<td>DiSalvo</td>
<td>250</td>
<td>&gt;70</td>
<td>87</td>
<td>41</td>
<td>17</td>
<td></td>
</tr>
<tr>
<td>Remadi</td>
<td>348</td>
<td>&gt;75</td>
<td>72</td>
<td>29</td>
<td>16</td>
<td>48</td>
</tr>
<tr>
<td>Lopez-Wolf</td>
<td>582</td>
<td>&gt;80</td>
<td>34</td>
<td>17</td>
<td>20</td>
<td></td>
</tr>
<tr>
<td>Oliver</td>
<td>454</td>
<td>&gt;80</td>
<td>51</td>
<td>31</td>
<td>16</td>
<td>37</td>
</tr>
</tbody>
</table>
Long-term survival

![Cumulative Survival Graph]

- < 65 years old
  - Time (days): 0, 90, 180, 270, 365
  - Survival rates: 230, 195, 185, 176, 173

- 65-80 years old
  - Time (days): 0, 90, 180, 270, 365
  - Survival rates: 173, 142, 137, 133, 130

- ≥ 80 years old
  - Time (days): 0, 90, 180, 270, 365
  - Survival rates: 53, 58, 55, 54, 51

- p = 0.001
- p = 0.07
- p = 0.009
Surgical treatment

Theoretical indication for surgery

- <65 years: 79.1%
- 65-80 years: 78%
- >80 years: 75%

Surgery performed

- <65 years: 66%
- 65-80 years: 54%
- >80 years: 31.4%

p=ns

p<0.001
Mortality in octogenarians

- <65 years
- 65-80 years
- >80 years

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<th>Category</th>
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<tr>
<td>Total</td>
<td>13%</td>
<td>19.7%</td>
<td>37.3%</td>
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<td>Patients with surgical indication</td>
<td>14.8%</td>
<td>23%</td>
<td>44.7%</td>
</tr>
<tr>
<td>Patients operated (with surgical indication)</td>
<td>10.1%</td>
<td>9.6%</td>
<td>6.3%</td>
</tr>
<tr>
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<td>36.4%</td>
<td>53.7%</td>
<td>72.7%</td>
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Mortality in octogenarians

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Mortality in octogenarians
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Mortality in octogenarians

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</tr>
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</table>
Definite IE among > 80 year-old patients (n= 51)

Indication for surgery according to ESC guidelines n= 38

- Surgery performed n=16 (42.1%)
  - Mortality n=1 (6.3%)
- Surgery not performed n=22 (57.9%)
  - Mortality n=16 (72.7%)

No indication for surgery according to ESC guidelines n= 13

- Surgery performed n= 0 (0%)
  - Mortality n=2 (15.4%)
- Surgery not performed n=13 (100%)
Conclusions

1. IE in elderly carries specific clinical and prognostic features
2. Higher incidence of pacemaker infection, spondylitis, and digestive or urinary portal of entry
3. Enterococcus is the most frequent microorganism
4. Implementation of ESC guidelines is poor and surgery is underused
5. Octogenarians who can be treated by surgical therapy present with a low mortality, similar to that of younger patients
6. TAVI endocarditis will probably the most frequent cause of IE in octogenarians in the future