TAVI Endocarditis

Gilbert Habib
La Timone Hospital
Marseille - France

EuroValves Brussels, 10 March 2016
513 patients with complicated IE, 230 (40%) surgical therapy

6 month mortality

Vikram– JAMA 2003; 290: 3207
IE: a deadly disease!!: Prosthetic IE

Lalani T– JAMA 2013
Survival after TAVI endocarditis

Amat-Santos IJ et al. Circulation 2015
IE: a deadly disease!!

Vikram– JAMA 2003

Lalani T– JAMA 2013

Amat-Santos IJ et al. Circulation 2015

513 patients Native Valve IE

1025 patients Prosthetic Valve IE

53 patients TAVI IE
Case 1: TAVI endocarditis

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

CT scan: positive

PET CT: negative
Patient 2: Valve-in-valve PVE

History of the disease

- 71 year-old man
- mitral bioprosthesis 2000
- severe Parkinson disease
- valve-in-valve MV replacement (transapical) June 2015
- October 2015: fever / suspected endocarditis

Clinical examination

- CHF
- systolic murmur 2/6
- blood pressure: 100/70 mmHg
- arrhythmia (atrial fibrillation)
Patient 2: Valve-in-valve PVE

**Laboratory data**

- haemoglobin: 9 g / dl
- white blood cell: 13,000 / mm$^3$
- CRP = 130 mg/l
- creatinin = 125 mg/l
- BNP = 1100 ng/l

**Blood cultures:** Staphylococcus Methi-R (x 3)
TOE October 14th, 2015
Q1: What is your diagnosis?

1. Bioprosthetic Valve-in-valve endocarditis?
2. Pericardial effusion?
3. LV aneurysm?
4. LV false aneurysm?
cardiac CT scan

Mitral annulus pseudo-aneurysm

Apical false aneurysm
18FDG-PET-CT November 4th

Uptake on the prosthesis

Uptake on the apical LV false aneurysm
What is your diagnosis?

1. Bioprosthetic Valve-in-valve endocarditis
2. Pericardial effusion
3. LV aneurysm
4. LV false aneurysm
1. **Definite IE**

2. **Initiation of antibiotic therapy**
   - *initially*: Vancomycin with Gentamycin:
   - *then*: Cotrimoxazole with Clindamycin

3. **follow-up**
   - repeat TEE
   - repeat CT scan
Evolution under ATB therapy

October 14th, 2015

October 30th, 2015
Evolution under ATB therapy

October 14th, 2015

October 30th, 2015
Evolution under ATB therapy

October 14th, 2015

October 30th, 2015
Pulsatile false aneurysm
What is your management?

1. Antibiotic therapy alone?
2. Emergency surgery?
3. Elective surgery?
4. Other?
TAVI Endocarditis

1. incidence
2. prevention
3. diagnosis
4. treatment
• 2572 patients between 2008-2013
• 14 centers
• Sapien/Corevalve: 40-60%
• Median follow-up 1.1 year
• 29 IE
Infected Endocarditis Following Transcatheter Aortic Valve Implantation: Results from a Large Multicenter Registry


- 7944 patients between 2007-2014
- 21 centers
- Sapien/Corevalve: 80-20%
- Mean follow-up of 1.1 ± 1.2 year
- 53 IE
Prosthetic Valve Endocarditis After Transcatheter Aortic Valve Implantation


- 509 patients between 2007-2014
- Single-center
- Only CoreValve
- Median follow-up 1.4 year
- 18 IE
TAVI Endocarditis

1. incidence
2. prevention
3. diagnosis
4. treatment
Incidence of TAVI endocarditis

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

Incidence 34 / million

Incidence of TAVI endocarditis

Incidence 34 / million

Incidence of TAVI endocarditis

Incidence 34 / million \( \rightarrow \) 194 / million

Incidence per Million Population

<table>
<thead>
<tr>
<th>Age, years</th>
<th>Women</th>
<th>Men</th>
</tr>
</thead>
<tbody>
<tr>
<td>20-24</td>
<td></td>
<td></td>
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<tr>
<td>25-29</td>
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<tr>
<td>30-34</td>
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<td>&gt;=95</td>
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Incidence per Million Population

**Incidence of TAVI endocarditis**

Annual incidence: from 0.4 to 2.1 per 100 pts/year

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<thead>
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<th>Annual incidence (%)</th>
<th>Study</th>
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<td>0.4</td>
<td>Buellesfeld, JACC 2011</td>
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### Incidence of TAVI endocarditis

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**Case and cohorts**

**Specific large studies**

**Surgical prosthesis**

**ESC Guidelines 2015** 0.3-1.2
TAVI Endocarditis

1. incidence
2. prevention
3. diagnosis
4. treatment
## Bacteriological findings

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<td>Staph coag neg (%)</td>
<td>17</td>
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Timing of initial symptoms

Amat-Santos IJ et al. Circulation 2015

Timing of initial symptoms of infective endocarditis after TAVI (months)
Timing of initial symptoms

Bacteria/microorganisms: 2 enterococi; 4 staph; 3 others
Cardiac conditions at highest risk of IE

<table>
<thead>
<tr>
<th>Recommendations</th>
<th>Class</th>
<th>Level</th>
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<tr>
<td>Antibiotic prophylaxis should only be considered for patients at highest risk of IE:</td>
<td></td>
<td></td>
</tr>
<tr>
<td>1. Patients with a prosthetic valve, including transcatheter valve, or a prosthetic material used for cardiac valve repair.</td>
<td>IIa</td>
<td>C</td>
</tr>
<tr>
<td>2. Patients with previous IE.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>3. Patients with congenital heart disease.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>a. any cyanotic congenital heart disease</td>
<td></td>
<td></td>
</tr>
<tr>
<td>b. congenital heart disease repaired with prosthetic material whether placed surgically or by percutaneous techniques, up to 6 months after the procedure or lifelong if there remains residual shunt or valvular regurgitation.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Antibiotic prophylaxis is not recommended in other forms of valvular or congenital heart disease.</td>
<td>III</td>
<td>C</td>
</tr>
</tbody>
</table>
# Non-specific prevention measures

These measures should ideally be applied to the general population and particularly reinforced in high-risk patients.

- Strict dental and cutaneous hygiene. Dental follow-up should be performed twice a year in high-risk patients and yearly in the others.
- Disinfection of wounds.
- Eradication or decrease of chronic bacterial carriage: skin, urine.
- Curative antibiotics for any focus of bacterial infection.
- No self-medication with antibiotics.
- Strict asepsis control measures for any at-risk procedure.
- Discourage piercing and tattooing.

- Limit the use of infusion catheters and invasive procedure when possible. Favour peripheral over central catheters, and systematic replacement of the peripheral catheter every 3–4 days. Strict adherence to care bundles for central and peripheral cannulae should be performed.
# Antibiotic prophylaxis before cardiac or vascular interventions

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<th>Level</th>
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<td>Pre-operative screening of nasal carriage of <em>Staphylococcus aureus</em> is recommended before elective cardiac surgery in order to treat carriers.</td>
<td>I</td>
<td>A</td>
</tr>
<tr>
<td>Peri-operative prophylaxis is recommended before pacemaker or implantable cardioverter defibrillator implantation.</td>
<td>I</td>
<td>B</td>
</tr>
<tr>
<td>Elimination of potential sources of dental sepsis is recommended &gt;2 weeks before implantation of a prosthetic valve or other intracardiac or intravascular foreign material, except in urgent procedures.</td>
<td>I</td>
<td>C</td>
</tr>
<tr>
<td><strong>Peri-operative antibiotic prophylaxis should be considered in patients undergoing surgical or transcathester implantation of a prosthetic valve, intravascular prosthetic, or other foreign material.</strong></td>
<td>IIa</td>
<td>C</td>
</tr>
<tr>
<td>Systematic local treatment without screening for <em>Staphylococcus aureus</em> is not recommended.</td>
<td>III</td>
<td>C</td>
</tr>
</tbody>
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Prophylaxis before TAVI

- In the 3 papers: All patients received antibiotic prophylaxis
  - JACC: according to institutional practice...
  - Circulation: Cephalosporins in 14/21 centers (67%), vancomycin in 6 (28%) and piperacillin/tazobactam in 1 (5%).
  - Circ cardiovasc int: cefuroxime 1.5 g IV pre TAVI, 8 and 16 h after.
In the 3 papers: All patients received antibiotic prophylaxis

- JACC: according to institutional practice...
- Circulation: Cephalosporins in 14/21 centers (67%), vancomycin in 6 (28%) and piperacillin/tazobactam in 1 (5%) .
- Circ cardiovasc int: cefuroxime 1.5 g IV pre TAVI, 8 and 16 h after.

“Cephalosporins are traditionally used, but this choice could be reconsidered if it is confirmed that enterococci are important pathogens in very early TAVI-PVE.”
TAVI Endocarditis

1. incidence
2. prevention
3. diagnosis
4. treatment
The Duke echographic criteria


vegetation

abscess

new dehiscence of prosthetic valve
TOE 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

1 - Repeat echo (TTE + TOE)/microbiology
2 - $^{18}$F-FDG PET/CT or Leucocytes labeled SPECT/CT
3 - Cardiac CT
4 - Imaging for embolic events

ESC 2015 modified diagnostic criteria

Definite IE

Possible IE

Rejected IE
TAVI Endocarditis

1. incidence
2. prevention
3. diagnosis
4. *treatment*
## Indications and timing of surgery

<table>
<thead>
<tr>
<th>Indications for surgery</th>
<th>Timing</th>
<th>Class</th>
<th>Level</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>1. Heart Failure</strong></td>
<td></td>
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</tr>
<tr>
<td>Aortic or mitral NVE or PVE with severe acute regurgitation, obstruction or fistula causing refractory pulmonary oedema or cardiogenic shock.</td>
<td>Emergency</td>
<td>I</td>
<td>B</td>
</tr>
<tr>
<td>Aortic or mitral NVE or PVE with severe regurgitation or obstruction causing symptoms of HF or echocardiographic signs of poor haemodynamic tolerance.</td>
<td>Urgent</td>
<td>I</td>
<td>B</td>
</tr>
<tr>
<td><strong>2. Uncontrolled infection</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Locally uncontrolled infection (abscess, false aneurysm, fistula, enlarging vegetation).</td>
<td>Urgent</td>
<td>I</td>
<td>B</td>
</tr>
<tr>
<td>Infection caused by fungi or multiresistant organisms.</td>
<td>Urgent/elective</td>
<td>I</td>
<td>C</td>
</tr>
<tr>
<td>Persisting positive blood cultures despite appropriate antibiotic therapy and adequate control of septic metastatic foci.</td>
<td>Urgent</td>
<td>IIa</td>
<td>B</td>
</tr>
<tr>
<td>PVE caused by staphylococci or non-HACEK Gram negative bacteria.</td>
<td>Urgent/elective</td>
<td>IIa</td>
<td>C</td>
</tr>
<tr>
<td><strong>3. Prevention of embolism</strong></td>
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<td></td>
<td></td>
</tr>
<tr>
<td>Aortic or mitral NVE or PVE with persistent vegetations &gt;10 mm after one or more embolic episode despite appropriate antibiotic therapy.</td>
<td>Urgent</td>
<td>I</td>
<td>B</td>
</tr>
<tr>
<td>Aortic or mitral NVE with vegetations &gt;10 mm, associated with severe valve stenosis or regurgitation, and low operative risk.</td>
<td>Urgent</td>
<td>IIa</td>
<td>B</td>
</tr>
<tr>
<td>Aortic or mitral NVE or PVE with isolated very large vegetations (&gt;30 mm).</td>
<td>Urgent</td>
<td>IIa</td>
<td>B</td>
</tr>
<tr>
<td>Aortic or mitral NVE or PVE with isolated large vegetations (&gt;15 mm) and no other indication for surgery.</td>
<td>Urgent</td>
<td>IIb</td>
<td>C</td>
</tr>
</tbody>
</table>
Evolution under ATB therapy

October 14th, 2015

October 30th, 2015
Decision: transcatheter closure
Amplatzer deployment
Final result

Per procedure

TTE November 9, 2015
Take-home messages: TAVI endocarditis

1. Incidence 0.4-2.1%
2. Frail patients, atypical presentation
3. Diagnosis more difficult
4. Role of PET-CT?
5. Specific Antibiotic prophylaxis?