PROSTHETIC VALVE ENDOCARDITIS
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EUROVALVE CONGRESS
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Prosthetic Valve Endocarditis – A Dangerous Disease

- Affects 1-6% of prosthetic valves
- Mechanical and biological valves equally prone
- Difficult to diagnose and treat
- In-hospital mortality 20-30%
- One year mortality >50%
- Non-fatal complications
  - Acute stroke 15%
  - CHF 30%
  - Thromboembolic events >20%
- Redo surgery 65%

Tleyjah IM et al. JAMA 2005;293:3022-3028.
History (1)

♥ 73 yr old male – smoker, Type II DM, hyperlipidaemia, COPD

♥ 1995: CHF 2° to IHD with significant MR (annular dilatation)
  • #29 bileaflet MVR with CABG x1 (vein graft to RCA)
  • Post-op cerebral infarct with grand mal seizures
  • Complete recovery – NYHA I

♥ March 2008: Enterococcal IE on mitral prosthesis
  • Malaise, weight loss and fever
  • 6/6 positive BCs – sens. benpen, vancomycin, ampicillin, amoxycillin
  • TOE – vegetations on prosthesis, no MR
  • No haemodynamic compromise – good response to antibiotic therapy
  • CT colon – diverticular disease & 3 polyps – excision via colonoscopy

♥ October 2008: Full recovery – normal inflammatory markers
**History (2)**

❤ April 2009 – emergency admission
- 3/12 weight loss, malaise
- 1/12 intermittent fever, dyspnoea, haemoptysis
- Unwell, AF 140 min-1, BP 120/70, continuous mitral murmur

❤ Initial investigations
- Hb 10.7g/dl, WCC 19.1x10^9/L, Platelets 380 x10^9/L
- Creatinine 150mmol/L, CRP 89 IU/L, INR 3.4
- BCs – 6/8 positive for enterococcus (sensitivities as previously)
- Unable to compare with previous organism

❤ Progressive deterioration
- Type I respiratory failure requiring CPAP
- Deteriorating renal and liver function
- Surgeons reluctant to operate
- Haemodynamic compromise requiring IABP
- Angiography – minor left coronary disease, occluded RCA and RCA vein graft
Further investigations
Audience Question

Surgery is the treatment of choice for this patient:

1: Yes – and my surgeon would be ready and willing

2: Yes – but it would be difficult to persuade my surgeon

3: Too late – medical therapy only with dire prognosis
Prosthetic valve endocarditis (PVE)

The most severe form of IE: mortality can approach 50%
16-26% of all IE in contemporary series
Affects 1-6% of patients with prosthetic valves: 0.3-1.2% per pt year
Frequent in out-patients with regular healthcare contact
Mechanical and bioprosthetic valves equally susceptible
Diagnosis difficult: echocardiography and blood cultures often negative

<table>
<thead>
<tr>
<th>EARLY</th>
<th>LATE</th>
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</thead>
<tbody>
<tr>
<td>&lt;12 months after surgery</td>
<td>&gt;12 months after surgery</td>
</tr>
<tr>
<td>Staphylococci predominate</td>
<td>Organisms mirror those in native valve IE</td>
</tr>
<tr>
<td>Risk high (5%) in patients with valve replacement for active IE</td>
<td>Complications are less frequent</td>
</tr>
<tr>
<td>Lesions severe: associated with abscesses, prosthesis dehiscence</td>
<td>Medical therapy may be sufficient in the absence of perivalvular infection</td>
</tr>
<tr>
<td>Redo surgery reduces mortality but is often difficult</td>
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Contemporary Clinical Profile and Outcome of Prosthetic Valve Endocarditis

Prospective cohort study 2670 adults with definite IE
58 hospitals in 25 countries worldwide
556 (20%) with prosthetic valve IE

Diagnosis

- Difficult!
- Atypical presentation frequent in early cases
- Often ascribed to post-operative recovery with inappropriate antibiotic use
- Blood cultures frequently negative
- Duke criteria insensitive
- Specialist assessment, fresh blood cultures
- TOE mandatory
• 72 consecutive pts with suspected PVE
• Systematic CT/PET plus usual diagnostic assessment
• Classification according to mod. Duke criteria over 3/12 FU
• Abnormal FDG uptake in 50%
• Increased sensitivity of Duke criteria (70% vs. 97%, p=0.008)
• Principally due to reduced number of possible cases
Prosthetic valve endocarditis: treatment

- Some studies suggest improved outcome with surgery in comparison with antibiotic therapy alone.
- Studies are small with inherent selection bias.
- Benefits of surgery are most prominent in staphylococcal infection and when perivalvular infection is apparent.

<table>
<thead>
<tr>
<th></th>
<th>Era</th>
<th>n</th>
<th>Surgery (%)</th>
<th>Mortality (%)</th>
<th>Surgical mortality (%)</th>
<th>Medical mortality (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Barcelona1</td>
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<td>46</td>
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<tr>
<td>5</td>
<td>Cleveland5</td>
<td>77</td>
<td>70</td>
<td>24</td>
<td>8</td>
<td>35</td>
</tr>
</tbody>
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Optimal Timing of Surgery: Destructive IE

- **Medical treatment**
  - Emergency: <24 hours
  - Urgent: within a few days
  - Elective: >1-2 weeks of antibiotic therapy

- **Surgical treatment**

- **Optimal timing**
Guidelines on the prevention, diagnosis, and treatment of infective endocarditis (new version 2009)

The Task Force on the Prevention, Diagnosis, and Treatment of Infective Endocarditis of the European Society of Cardiology (ESC)

Endorsed by the European Society of Clinical Microbiology and Infectious Diseases (ESCMID) and by the International Society of Chemotherapy (ISC) for Infection and Cancer

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### Indications for surgery in PVE

<table>
<thead>
<tr>
<th>A - HEART FAILURE</th>
<th>Timing*</th>
<th>Class*</th>
<th>Levelb</th>
</tr>
</thead>
<tbody>
<tr>
<td>PVE with severe prosthetic dysfunction (dehiscence or obstruction) causing refractory pulmonary oedema or cardiogenic shock</td>
<td>Emergency</td>
<td>I</td>
<td>B</td>
</tr>
<tr>
<td>PVE with fistula into a cardiac chamber or pericardium causing refractory pulmonary oedema or shock</td>
<td>Emergency</td>
<td>I</td>
<td>B</td>
</tr>
<tr>
<td>PVE with severe prosthetic dysfunction and persisting heart failure</td>
<td>Urgent</td>
<td>I</td>
<td>B</td>
</tr>
<tr>
<td>Severe prosthetic dehiscence without HF</td>
<td>Elective</td>
<td>I</td>
<td>B</td>
</tr>
</tbody>
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<table>
<thead>
<tr>
<th>B - UNCONTROLLED INFECTION</th>
<th>Timing*</th>
<th>Class*</th>
<th>Levelb</th>
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<tbody>
<tr>
<td>Locally uncontrolled infection (abscess, false aneurysm, fistula, enlarging vegetation)</td>
<td>Urgent</td>
<td>I</td>
<td>B</td>
</tr>
<tr>
<td>PVE caused by fungi or multiresistant organisms</td>
<td>Urgent/elective</td>
<td>I</td>
<td>B</td>
</tr>
<tr>
<td>PVE with persisting fever and positive blood cultures &gt; 7–10 days</td>
<td>Urgent</td>
<td>I</td>
<td>B</td>
</tr>
<tr>
<td>PVE caused by staphylococci or gram negative bacteria (most cases of early PVE)</td>
<td>Urgent/elective</td>
<td>IIa</td>
<td>C</td>
</tr>
</tbody>
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<table>
<thead>
<tr>
<th>C - PREVENTION OF EMBOLISM</th>
<th>Timing*</th>
<th>Class*</th>
<th>Levelb</th>
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<tr>
<td>PVE with recurrent emboli despite appropriate antibiotic treatment</td>
<td>Urgent</td>
<td>I</td>
<td>B</td>
</tr>
<tr>
<td>PVE with large vegetations (&gt; 10 mm) and other predictors of complicated course (heart failure, persistent infection, abscess)</td>
<td>Urgent</td>
<td>I</td>
<td>C</td>
</tr>
<tr>
<td>PVE with isolated very large vegetations (&gt; 15 mm)</td>
<td>Urgent</td>
<td>IIb</td>
<td>C</td>
</tr>
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Clinical Progress and Outcome

❤️ Inevitable mortality without surgery

❤️ Redo MVR with #29 Mira valve
  - Extensive adhesions
  - Large vegetations impeding discs
  - Severe valve dehiscence – enterococcus on culture
Clinical Progress and Outcome

❤ Inevitable mortality without surgery

❤ Redo MVR with #29 Mira valve
  ● Extensive adhesions
  ● Large vegetations impeding discs
  ● Severe valve dehiscence – enterococcus on culture

❤ Difficult post-operative course (39 days ITU)
  ● Antibiotic regime: 6/52 benzylpenicillin, 2/52 gentamicin
  ● Prolonged inotropic & respiratory support (tracheostomy)
  ● Persistent atrial fibrillation/flutter
  ● Loculated pleural effusions (VATS) – Pseudomonas – 1/52 Tazocin
  ● Acute renal failure (dialysis)
  ● Pressure sore

❤ Discharged to community hospital day 72
  ● Fit and well – normal inflammatory markers
Take-home messages

❤ PVE remains an infrequent yet challenging condition
❤ Evidence is scarce but international guidelines (ESC) provide clear advice on management
❤ Antibiotic treatment is difficult; specialist advice is required
❤ Prevention is better than cure
❤ Medical therapy is reasonable in patients with early diagnosis, sensitive organisms, good antibiotic response and reassuring echo findings
❤ Early surgery is recommended for aggressive organisms (especially *S. aureus*), antibiotic failure, abscess formation, major prosthetic leak and fistula formation
❤ Cardiologists need the help of brave surgeons!
❤ Close communication and an IE team (cardiologist, surgeon, microbiologist) underlie successful management