The influence of prosthesis-patient mismatch and impaired LV-function on outcome after aortic valve replacement

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The influence of prosthesis-patient mismatch on survival among impaired LV-function patients after aortic valve replacement

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Prosthesis Patient Mismatch (PPM)

indexed effective orifice area (iEOA)
≤ 0.85 cm² EOA /m² body surface area (BSA)
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Indexed effective orifice area (iEOA) ≤ 0.85 cm² EOA / m² body surface area (BSA)
Patient prosthesis mismatch affects short- and long-term outcomes after aortic valve replacement


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Impact of Prosthesis-Patient Mismatch on Long-Term Survival After Aortic Valve Replacement

Influence of Age, Obesity, and Left Ventricular Dysfunction

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Philippe Pibarot, DVM, PhD, FACC, FAHA* Quebec, Québec, Canada; and Tours, France

Patient-Prosthesis Mismatch in Patients With Aortic Stenosis Undergoing Isolated Aortic Valve Replacement Does Not Affect Survival

Neil J. Howell, MRCS, Bruce E. Keogh, FRCS, Daniel Ray, PhD, Robert S. Bonser, FRCS, Tim R. Graham, FRCS, Jorge Mascaro, FRCS, Stephen J. Rooney, FRCS, Ian C. Wilson, RRCs, and Domenico Pagano, MD, FRCS (Eng: C-Th)

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Effect of Prosthesis-Patient Mismatch on Long-Term Survival With Aortic Valve Replacement: Assessment to 15 Years

W. R. Eric Jamieson, MD, Jian Ye, MD, Jennifer Higgins, MD, Anson Cheung, MD, Guy J. Fradet, MD, Peter Skarsgard, MD, Eva Germann, MS, Florence Chan, and Samuel V. Lichtenstein, MD, PhD

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The evidence for the importance of PPM after AVR is conflicting!!!
Age?  LV-Function?

In-vivo or in-vitro EOA?

Formula of bodysurface area?
Impact of Prosthesis-Patient Mismatch on
Long-Term Survival After Aortic Valve Replacement

Influence of Age, Obesity, and Left Ventricular Dysfunction

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Patient-Prosthesis Mismatch in Patients With Aortic
Stenosis Undergoing Isolated Aortic Valve
Replacement: Five-Year Follow-Up

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Does PPM in patients with impaired LV-function (EF<50%) affect survival?
1067 prosthetic aortic valve replacements (AVR) (2001 through 2009)

682 isolated AVR (63.9%)

385 AVR plus CABG (36.1%), mean grafts 2.4
Overall Survival after AVR

Median FU 3.2yrs (0-9.4)
Cumulative FU 3745 patient yrs

93.5% @ 3 mts
91.5% @ 1 yrs
87.6% @ 3 yrs
85.3% @ 5 yrs
83.1% @ 8 yrs
1067 prosthetic aortic valve replacements (AVR) (2001 - 2009)

- 255 mechanical prostheses (24%) mean 60yrs (18-83), male 75.7%

  SJM Masters – 17%
  SJM Regent – 3%
  MCRI On-X - 2,6%
  Carbomedics AP - 0,46%
1067 prosthetic aortic valve replacements (AVR) (2001 - 2009)

• 255 mechanical prostheses (24%) mean 60yrs (18-83), male 75.7%

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  Carbomedics AP - 0.46%

• 812 bioprostheses (76%) mean 75yrs (25-94), male 56%

  CE Perimount Magna - 35%
  SJM Epic – 17%
  Medtronic Mosaic -14%
  SJM Biocor – 7%
  Sorin Mitroflow – 3%
Mechanical vs Biological

Log Rank 0.000

Mechanical prostheses

Bioprostheses
Prosthesis-Patient Mismatch
indexed effective orifice area
≤ 0.85 cm² EOA /m² body surface area

• PPM 3.5% - mechanical prostheses (9/255)
• PPM 3.5% - mechanical prostheses (9/255)

• PPM 34.2% - bioprostheses (278/812)
Prosthesis-Patient Mismatch
indexed effective orifice area
\[ \leq 0.85 \text{ cm}^2 \text{ EOA} / \text{m}^2 \text{ body surface area} \]

- PPM 3.5% - mechanical prostheses (9/255)
- PPM 34.2% - bioprostheses (278/812)

Overall PPM, n=287 (23.9%)
Prosthesis-Patient Mismatch

Log Rank 0.218

after 4 yrs

Cumulative Survival

Years

0 2 4 6 8 10

No PPM

PPM
AVR with impaired LV-Function (EF<50%)

Log Rank 0.01

EF≥50% (30% PPM)

EF<50% (20% PPM)
Prosthesis-Patient Mismatch and EF<50%

Cumulative Survival vs Years

- EF≥50%, no PPM
- EF≥50%, PPM
Prosthesis-Patient Mismatch and EF<50%

Log Rank 0.000

- EF≥50%, no PPM
- EF≥50%, PPM
- EF<50%, no PPM
- EF<50%, PPM
204 isolated AVR (58.3%)

146 AVR + CABG (41.7%), mean 2.45 grafts
Log Rank 0.037

Prosthesis-Patient Mismatch (EF<50%)
Prosthesis-Patient Mismatch and EF<50% in patients ≤ 75 years

Log Rank 0.031
Prosthesis-Patient Mismatch and EF<50% in patients >75 years

Log Rank 0.96

EF<50%, no PPM

EF<50%, PPM
Gender (EF<50%)

Log Rank 0.64

Cumulative Survival vs Years

Female

Male
### Independent Predictors for Mortality – Cox PH Regression

<table>
<thead>
<tr>
<th>Prosthesis-patient mismatch</th>
<th>$p$-value</th>
<th>Hazard Ratio (95% CI)</th>
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<td>0.04</td>
<td>1.7 (1.02-2.8)</td>
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### Independent Predictors for Mortality – Cox PH Regression

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<tr>
<td>Prosthesis-patient mismatch</td>
<td>0.04</td>
<td>1.7 (1.02-2.8)</td>
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<tr>
<td>gender</td>
<td>0.69</td>
<td>0.9 (0.6-1.5)</td>
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<tr>
<td>Age (years)</td>
<td>0.00</td>
<td>1.09 (1.05-1.13)</td>
</tr>
<tr>
<td>Emergency surgery</td>
<td>0.00</td>
<td>2.5 (1.4-4.7)</td>
</tr>
<tr>
<td>X-Clamp Time (min.)</td>
<td>0.96</td>
<td>1.00 (0.99 -1.01)</td>
</tr>
<tr>
<td>IABP</td>
<td>0.00</td>
<td>5.3 (2.9-9.6)</td>
</tr>
<tr>
<td>Mechanical vs Biological</td>
<td>0.08</td>
<td>1.8 (0.9-3.9)</td>
</tr>
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Prosthesis-patient mismatch in combination with impaired LV-function (EF < 50%) after aortic valve replacement

✓ is an independent predictor of survival
✓ increases mortality risk by 69%
✓ shows no difference in gender