



Mesa Redonda
Cardiologia para o Clínico
Desproporção paciente-prótese em troca de
valva aórtica(*mismatch*): mito ou realidade?

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Título da Apresentação:

Desproporção paciente-prótese em troca de valva aórtica(*mismatch*): mito ou realidade?

Não possuo nenhum conflito de interesse relacionado a esta apresentação

Mismatch



Conceito original:

Mismatch é presente quando a área útil da prótese implantada é menor que a área da valva natural

Por esse conceito, todas as próteses implantadas apresentam *mismatch*

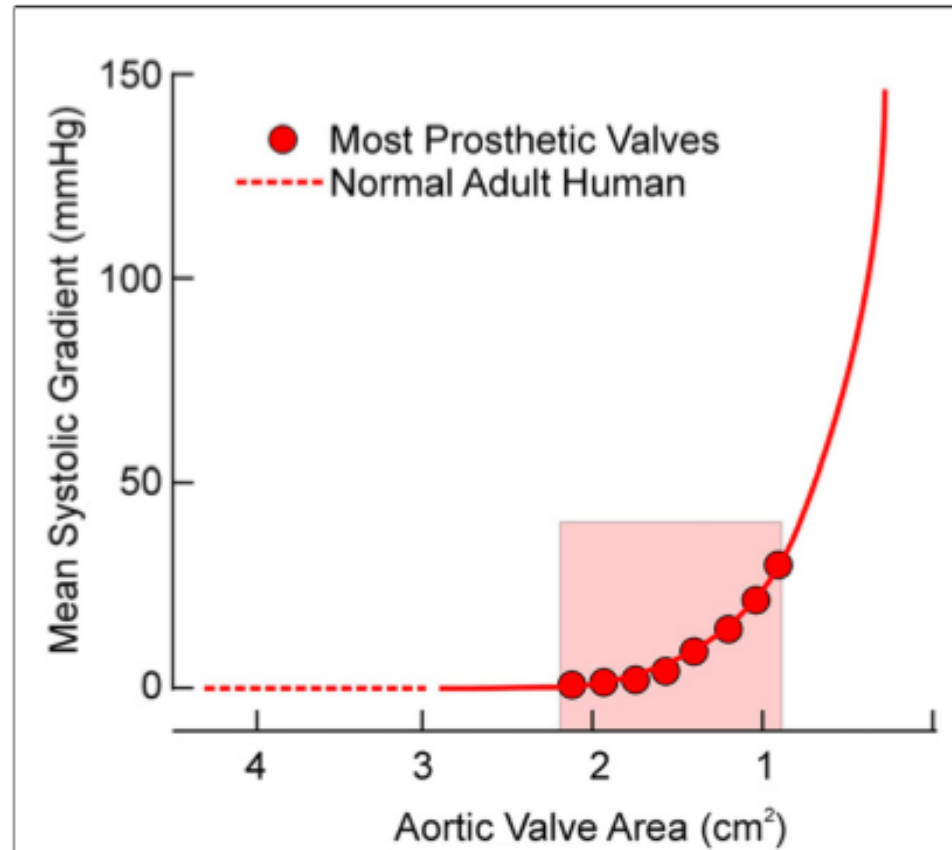


Figure 2 Relationship of Mean Systolic Gradient to AVA

Diagrammatic representation of the relationship between the mean systolic gradient (MSG) to the aortic valve area (AVA) assuming constant cardiac output and velocity of flow area. There is no gradient until the valve area is reduced by 50%, the MSG increases gradually (**red circles**), and when the valve area is reduced by >65%, it increases markedly (**red line**). Reprinted, with permission, from Rahimtoola (2).

Causas

Tamanho da prótese

Endotelização

Crescimento de tecidos

Trombose

Avaliação

Eco, cateterismo, RMN

Tamanho, área, orifício efetivo (índice m^2)



Conseqüências

Não afeta desfechos, exceto jovens e casos com disfunção VE

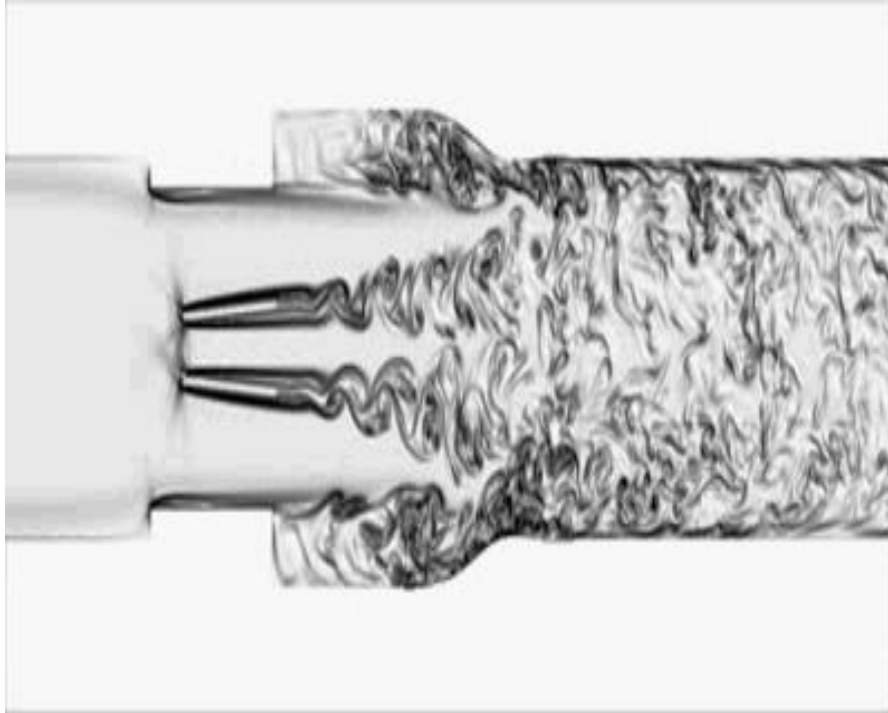
Estável, bem tolerada

Deterioração de sintomas, indica intervenção

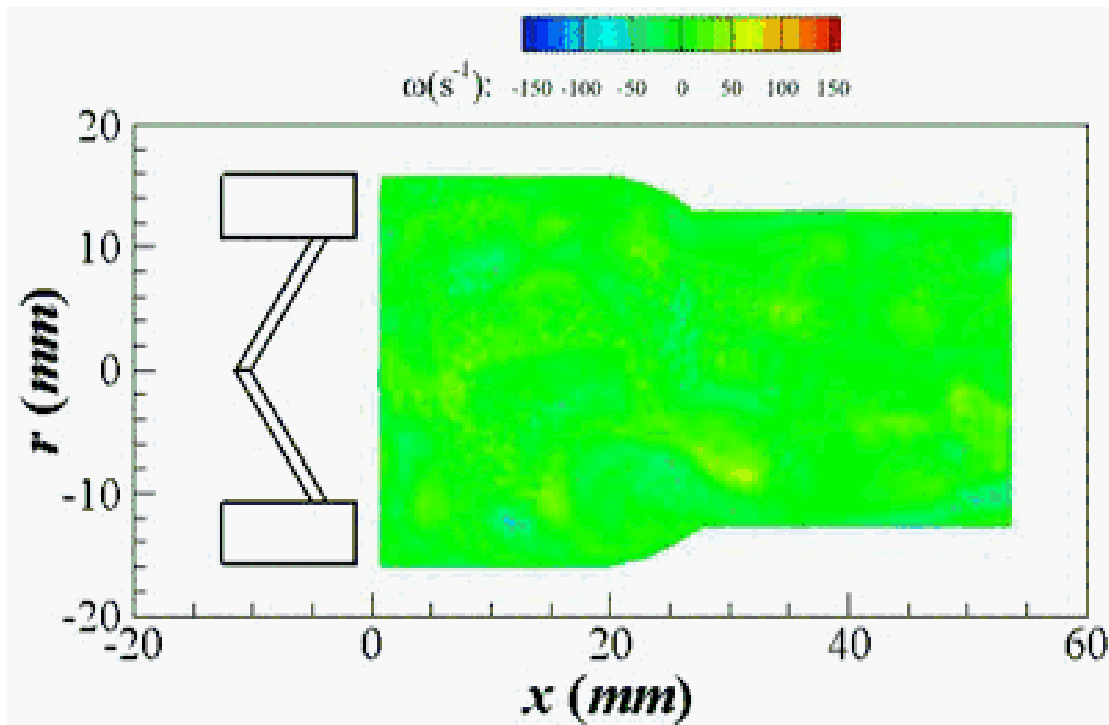
Hipertrofia VE, somente se muito severo

Insuficiência cardíaca

Reoperação, desnecessária na maioria



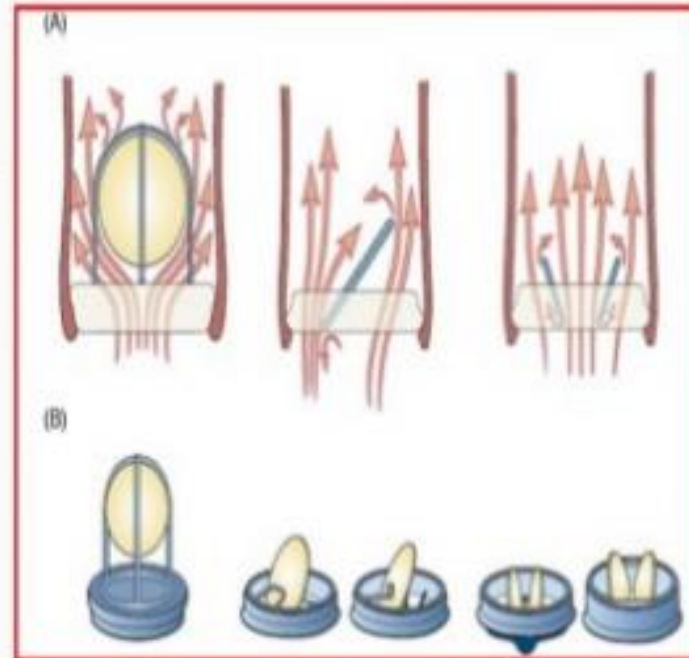
Cardiovascular Fluid Mechanics Laboratory, Emory University



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Challenges in doppler interrogation

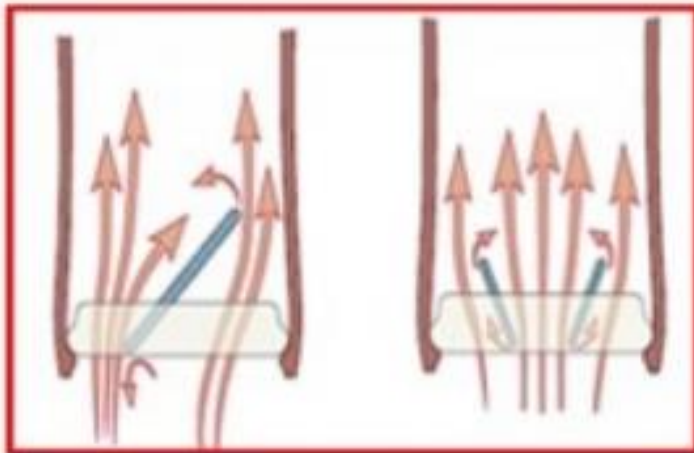
- variability of flow through and around the different prostheses
- Some prosthetic valves have more than one orifice and, consequently, a complex flow profile



EVALUATION OF PROSTHERIC VALVE
FUNCTION-METHODS AND CLINICAL UTILITY

Transprosthetic velocity and gradient

- The flow is
 - ✓ eccentric - monoleaflet valves ✓ multi-windows examination
 - ✓ three separate jets - bileaflet valves

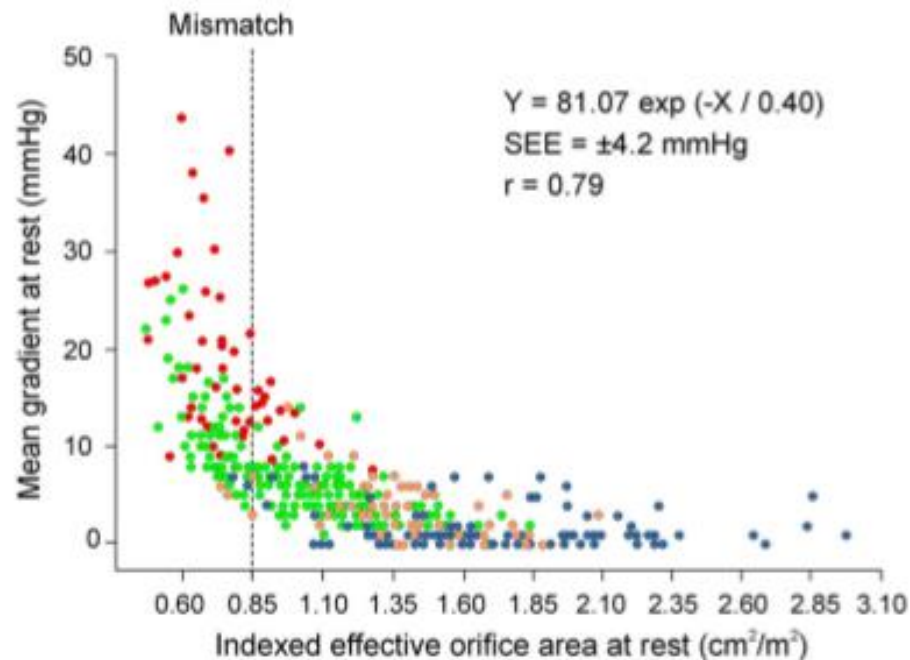


Localised high velocity may be recorded by continuous wave (CW) Doppler Interrogation through the smaller central orifice of the bileaflet mechanical prostheses



overestimation of gradient

EVALUATION OF PROSTHERIC VALVE
FUNCTION-METHODS AND CLINICAL UTILITY



- stented bioprosthesis, n = 51
- stentless bioprosthesis, n = 194
- aortic homograft, n = 55
- pulmonary autograft, n = 96

Figure 3 Mean Systolic Gradient Versus EOAI

The relationship of the mean systolic gradient (MSG) with the effective orifice area index (EOAI) at rest is shown. Mismatch is said to occur at an EOAI of $0.85 \text{ cm}^2/\text{m}^2$. However, there is a curvilinear relationship of MSG to EOAI, similar to that shown in Figure 2. SEE – standard error of the estimate. Reprinted, with permission, from Pibarot and Dumesnil (14).

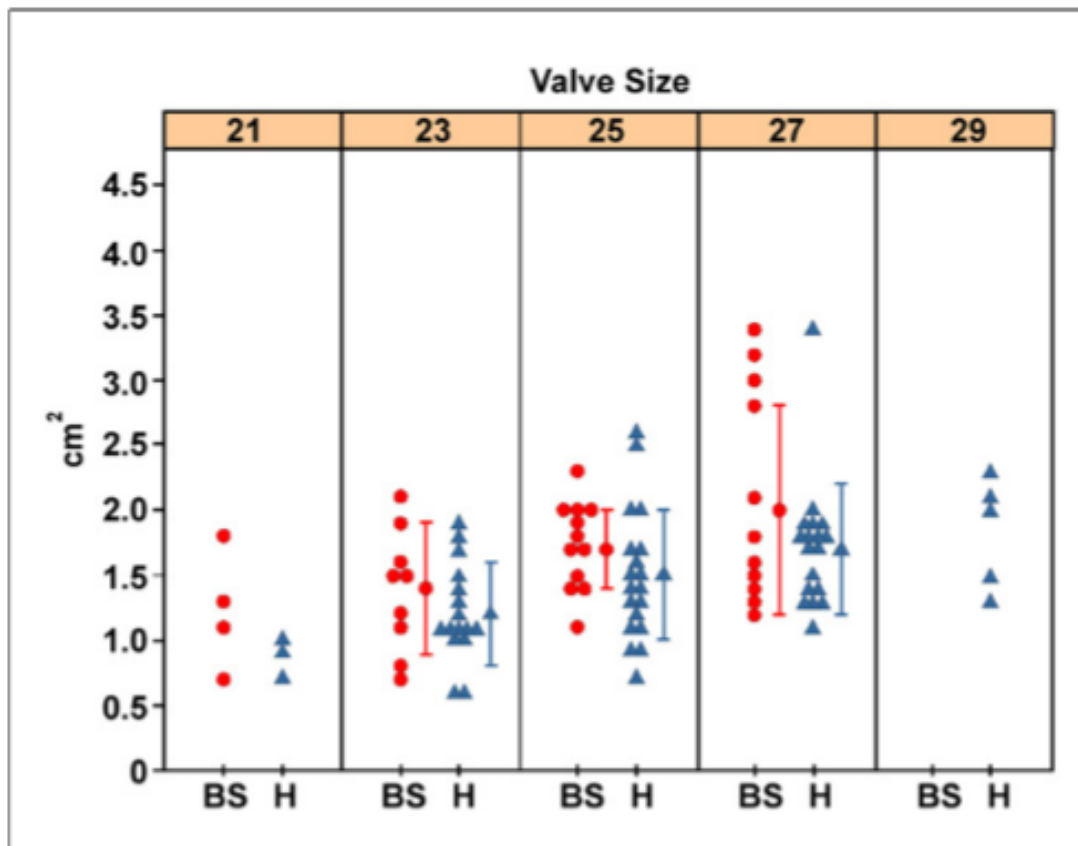


Figure 4 EOA of Bjork-Shiley and Hancock Porcine Valves

Data from cardiac catheterization studies performed 6 months after implantation of Bjork-Shiley (BS) (red circles) and Hancock (H) (blue triangles) valves in sizes 21 to 29. With both BS and H, the measured effective orifice area (EOA) in square centimeters shows a wide range. Error bars show mean and SD. Reprinted, with permission, from Khuri et al. (42).

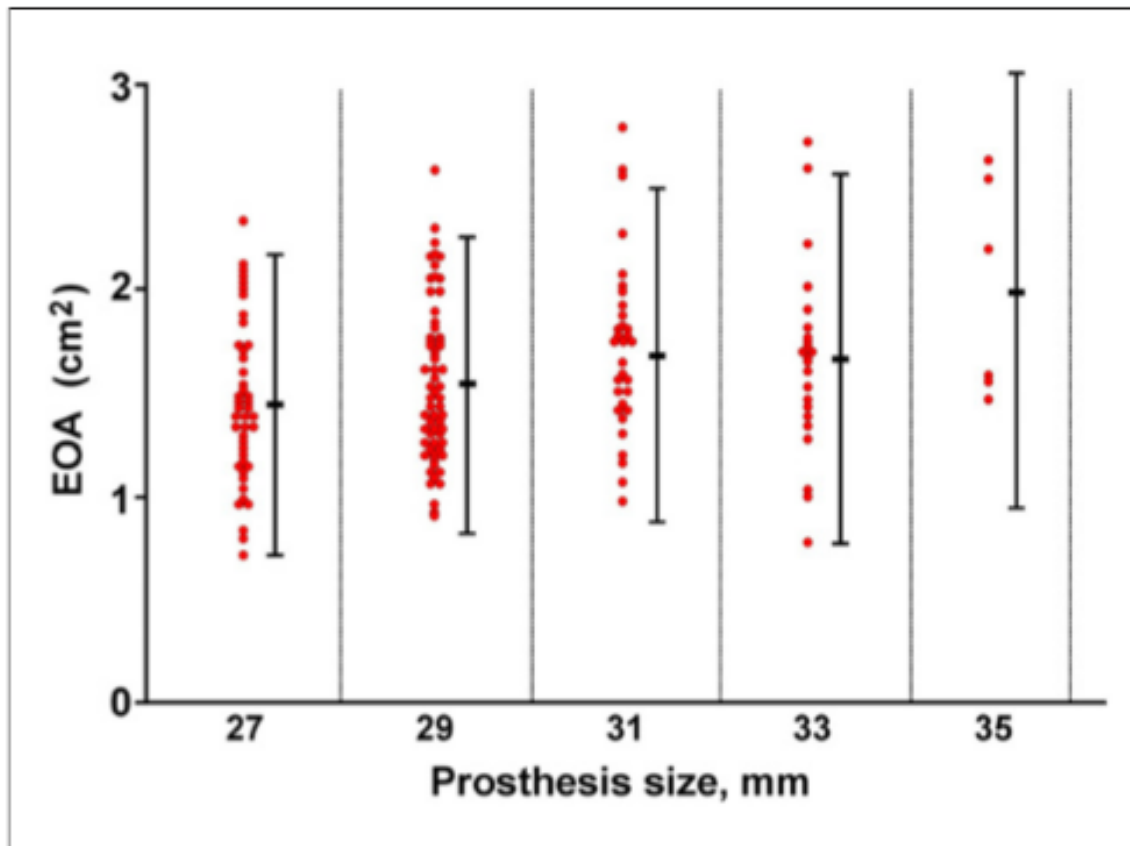


Figure 5 EOA of Different Sizes of Mitral Bioprosthesis

Carpentier-Edwards Duraflex “normal” porcine bioprosthesis sizes 27 to 35. Patient heart rates <100 beats/min, n = 218. Mean effective area (EOA) by conventional equation. Error bars shown are ± 2 SD. There is a considerable range of EOAs for each prosthesis size. Reprinted, with permission, from Blauwet et al. (43).

Chart 1
Effective orifice area in cm² of valve prostheses

Prosthesis	Size					
	19	21	23	25	27	29
Carpentier (cm ²)	1.3	1.5	1.8	2.0	2.1	2.2
St Jude Biocor (cm ²)	NA	1.2	1.4	1.7	2.1	NA
St Jude Standard (cm ²)	1.16	1.51	2.03	2.59	3.08	NA
Braile (cm ²)	1.3	1.6	1.9	2.4	2.6	3.1

NA = non-available

Table 1 EOA and EOAI in AS and VP-PM

Grading	AVA and EOA, cm²	AVA Index and EOAI, cm²/m²
Mild	>1.5	>0.9
Moderate	>1.0–1.5	>0.6–0.9
Severe	≤1.0	≤0.6
Very severe/critical*	≤0.7	≤0.4

Patients with borderline values of AVAs between moderate and severe (0.9 to 1.1 cm²; 0.55 to 0.65 cm²/m²) should be individually considered. *Critical is from Morrow et al. (33). Adapted, with permission, from Rahimtoola (22,34–37).

AS = aortic valve stenosis; AVA = aortic valve area; EOA = effective orifice area; EOAI = effective orifice area index; VP-PM = valve prosthesis–patient mismatch.

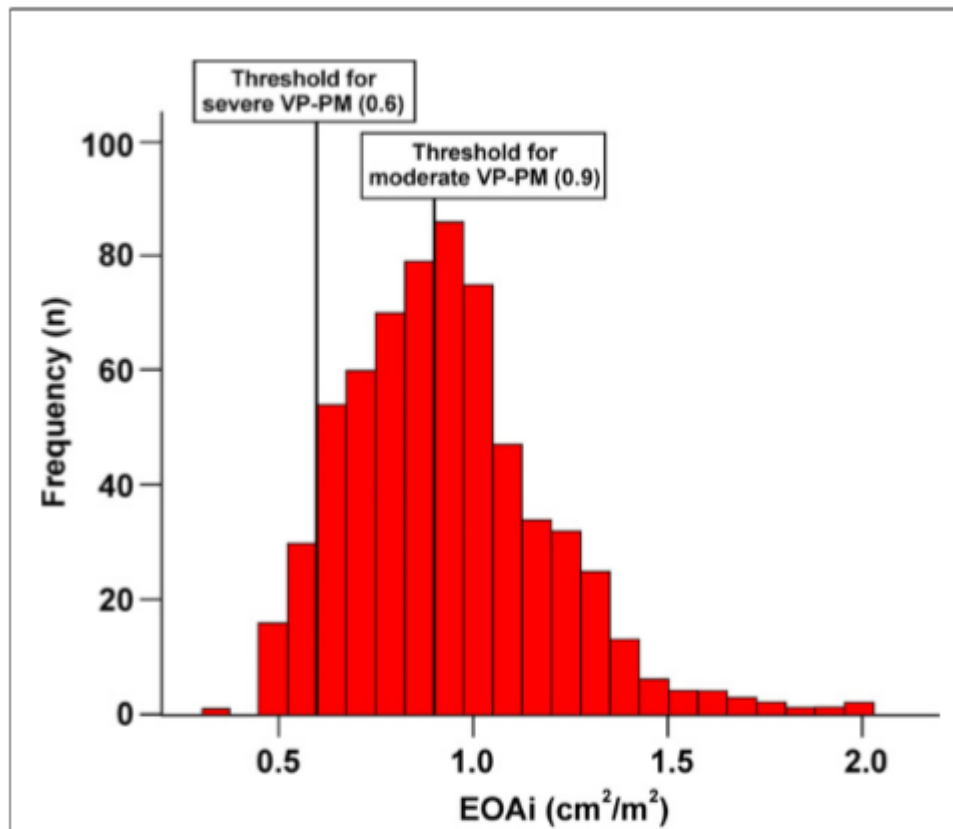


Figure 8 EOAi of 1 Prosthesis Type

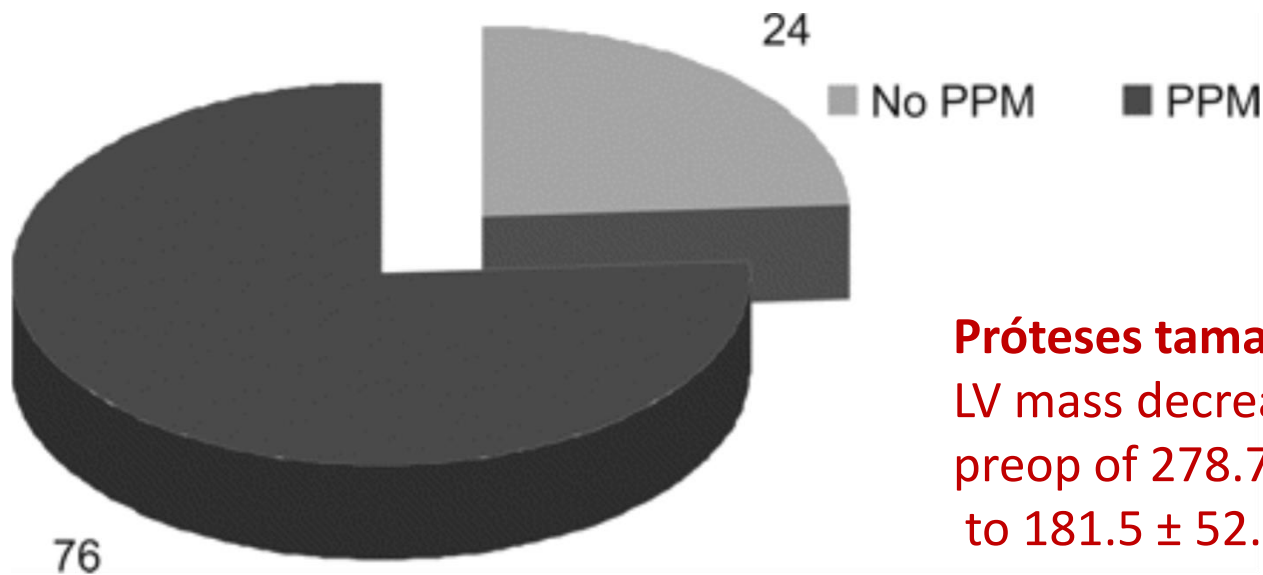
Histogram distribution of EOAi at 6 months after aortic valve replacement in 113 patients of the same type and size (Edwards Perimount size 23). The mean value of 1.82 cm²/m² may be the only parameter inserted into a reference table. Most patients would have moderate VP-PM, many would have mild VP-PM, and few would have severe VP-PM. Abbreviations as in Figure 7. Adapted and modified, with permission, from Bleiziffer et al. (45).

Diretriz Brasileira - SBC

Estenose importante:

mismatch prótese-paciente = (AOE indexada $\leq 0,85\text{cm}^2/\text{m}^2$)

		SBC	AHA	ESC
Retroca valvar cirúrgica	• Disfunção importante de prótese valvar, com sintomas	I B	I B	I C
	• Anemia hemolítica	IB	I B	I C
	• Disfunção importante de prótese valvar, assintomático, com baixo risco para cirurgia	Ila C	Ila C #	Ila C



Próteses tamanhos 17 e 19mm
 LV mass decreased significantly from preop of 278.7 ± 51.1 g to 181.5 ± 52.73 g, respectively.

Fig. 1. Percentage of patients that presented prosthesis-patient mismatch according Pibarot definition. Pibarot and colleagues defined PPM as being present if the effective orifice area index was <0.85 cm^2/m^2 .

PPM was considered as moderate if the EOAI was between 0.65 and 0.85 cm^2/m^2 and severe if it was <0.65 cm^2/m^2

EOAi, effective orifice area index; PPM, prosthesis-patient mismatch.

Valve prosthesis-patient mismatch: hemodynamic, echocardiographic and clinical consequences[☆]

Interact CardioVasc Thorac Surg. 2011;13(6):606-610. doi:10.1510/icvts.2011.283218

Interact CardioVasc Thorac Surg | Published by European Association for Cardio-Thoracic Surgery. All rights reserved.

Prosthesis–Patient Mismatch After Aortic Valve Replacement: Effect on Long-Term Survival

Table 2. Mechanical Prosthesis Characteristics

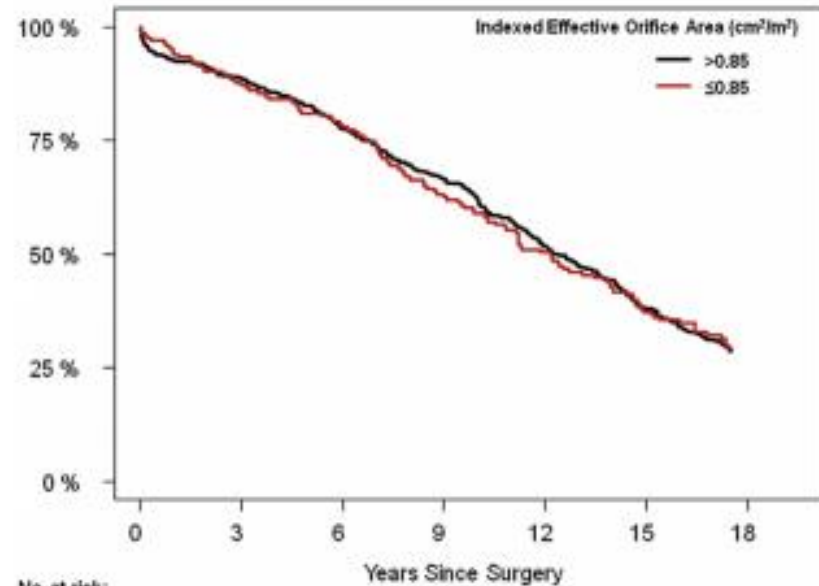
Characteristic	PPM (n = 163)	No PPM (n = 510)
Total number	88 (54.0)	342 (67.1)
Bileaflet	43 (48.9) ^a	176 (51.5) ^a
Tilting disc	45 (51.1) ^a	166 (48.5) ^a
Size (mm)		
19	1 (0.01) ^a	0
21	30 (34.1) ^a	8 (2.3) ^a
23	57 (64.8) ^a	71 (20.8) ^a
25	0	113 (33.0) ^a
27	0	98 (28.7) ^a
29	0	40 (11.7) ^a
31	0	10 (2.9) ^a
33	0	2 (0.6) ^{a,b}
EOA (cm ²)	1.35 ± 0.12	2.28 ± 0.71
iEOA (cm ² /m ²)	0.74 ± 0.06	1.21 ± 0.35

^a Percentage of total number of mechanical prostheses. ^b Mitral valve mechanical prosthesis (tilting disc), placed upside down.

Values are presented as n (%).

EOA = effective orifice area; iEOA = indexed effective orifice area; PPM = prosthesis–patient mismatch.

Survival



No. at risk:

Survival

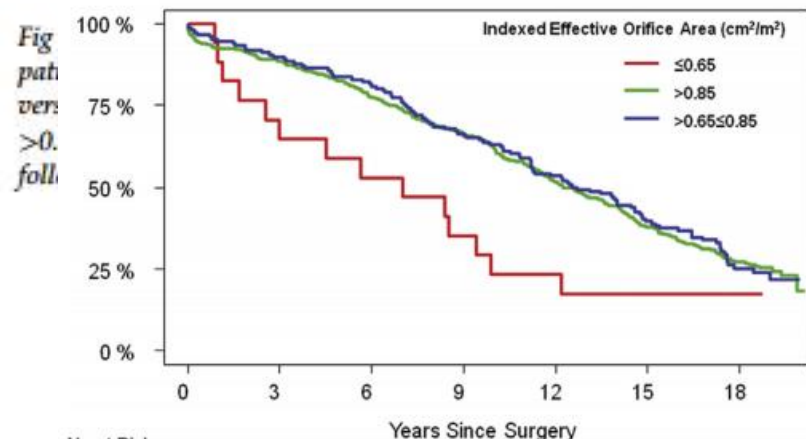


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No. at Risk:

PROSTHESIS-P.

17	11	9	6	4	3	3
510	450	394	338	263	189	82
146	131	118	96	78	57	22

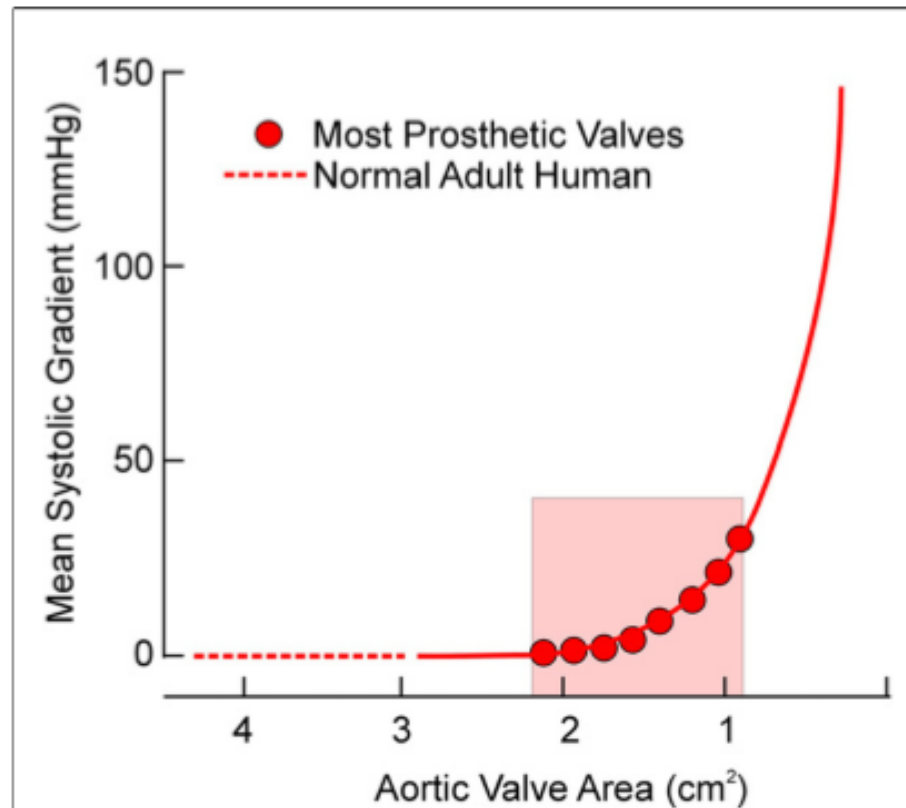
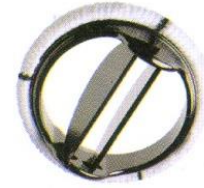


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Conclusões



- *Gradientes e áreas variam em função de indivíduos e de próteses, tamanhos e modelos*
- *Desproporção sempre existe*
- *Tolerada de leve, moderada e mesmo severa*
- *Intervenção se muito severa e sintomática*
- *Trombose responde a anticoag/trombolítico*
- *Sempre avaliar se há repercussão hemodinâmica ou sintomática*



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Table 3 Summary of Studies That Use Measured EOAI to Assess VP-PM: Data of Moderate and Severe VP-PM Are Combined

	Gelsomino et al. (51)	Sakamoto et al. (48)	Vicchio et al. (49)	Bleiziffer et al. (45)	Garatti et al. (50)
Study population	AVR with Cryolife O'Brien bioprosthesis; hospital survivors	AVR in patients ≥65 yrs of age. Patients with a root too small to accommodate a 19-mm valve underwent a root enlargement by the Nicks method.	Patients >70 yrs of age with severe aortic stenosis who received a 19-mm bileaflet mechanical valve; hospital survivors	All patients with bioprosthetic valves for whom echocardiography was performed at 6 months	17-mm AVR with mechanical valve
n	62	51	134 survivors of AVR	645	78

	PM				
Long-term outcome	No statistically significant difference in long-term mortality	No overall or valve-related mortality with moderate VP-PM; no difference in risk of thromboembolism with moderate VP-PM	No difference in overall survival, valve-related complications	1. Increased cardiac mortality if logarithmic EOAI used as a continuous variable, but not if VP-PM taken as a category. 2. Increased cardiac mortality with residual left ventricular hypertrophy with VP-PM compared with residual LV hypertrophy without VP-PM	No difference in gradients or mortality for patients with VP-PM

Data for moderate and severe are combined.
LV = left ventricular; other abbreviations as in Table 2.