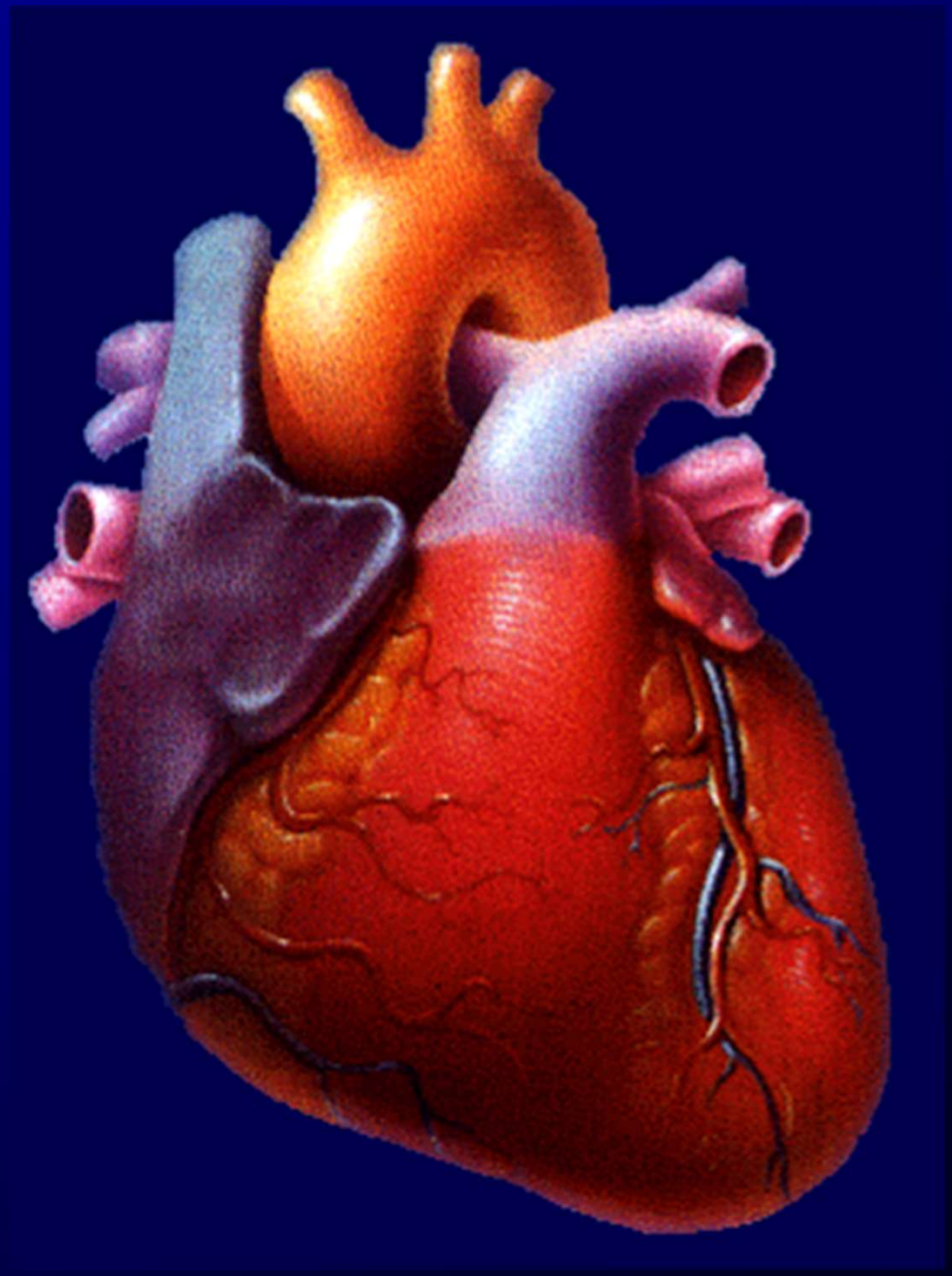
Webinar HCor – Setor de Ecocardiografia

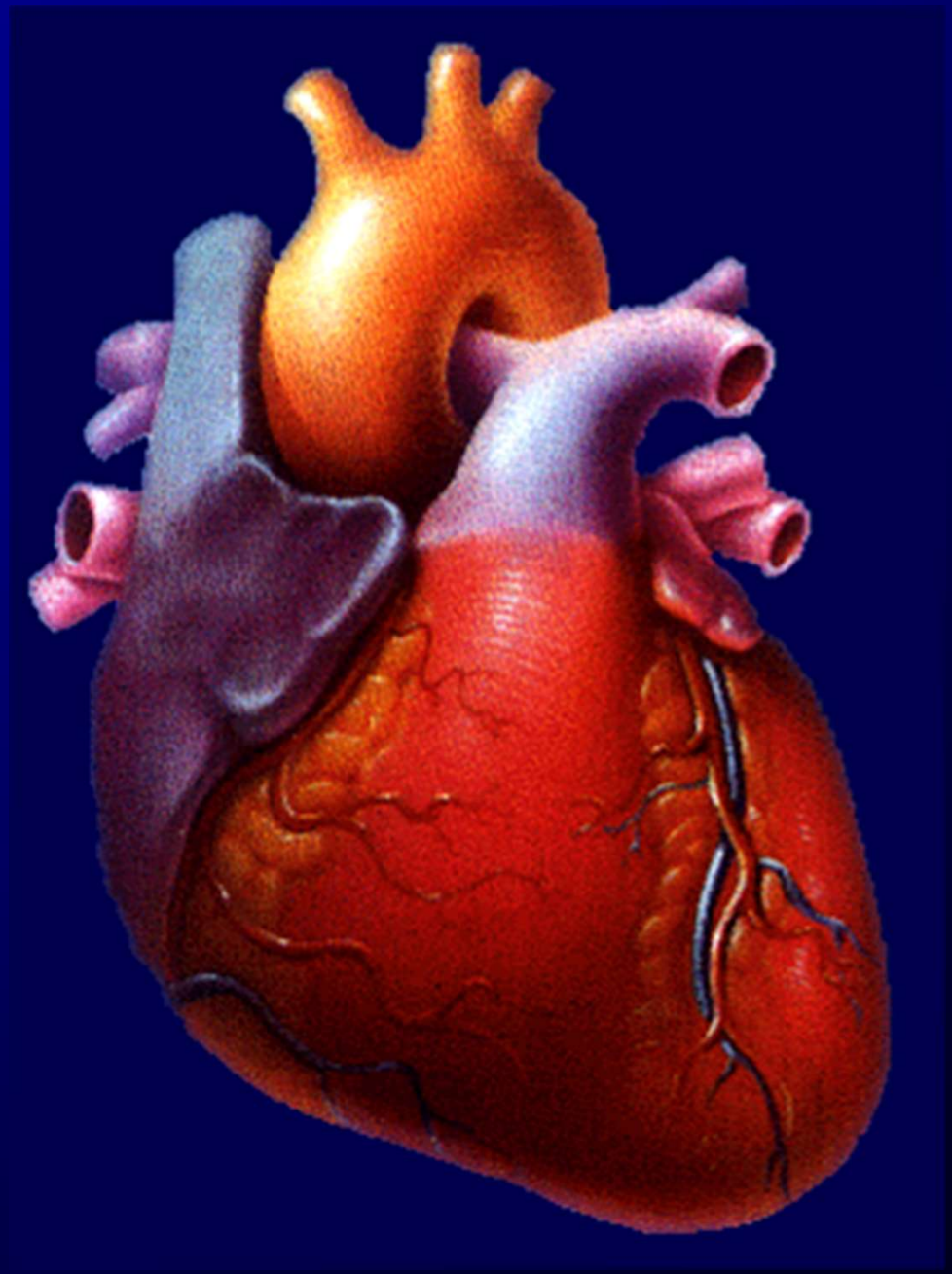
O que o cardiologista clínico deve saber na Valvopatia Aórtica ?



Dr. Manuel Paredes Horna

São Paulo - Brasil

Insuficiência Aórtica Importante



Ecocardiografia e Insuficiência Valvar Aórtica Importante

Subgrupos com Aumento do Risco de Morte

- Dispneia ou angina CF III ou IV – mortalidade anual de 25%
- Dilatação importante do VE > 70 mm
- Diâmetro Sistólico VE > 50 mm or >= 25 mm/m^2 *
- F.E. < 55% *

* mesmo assintomáticos

N Engl J Med Vol 351 (15) Oct 2004. 1539-1546

Ecocardiografia e Insuficiência Valvar Aórtica Importante

Pacientes Assintomáticos e Mortalidade

- Demora da Cx até o início dos síntomas:
  - Significativo risco de AUMENTO do VE e MORTE no pós operatório.
- Dilatação extrema do VE >= 80 mm :
  - Fator de risco conhecido de MORTE SÚBITA
- Disfunção sistólica VE no pré operatório:
  - O grau de disfunção sistólica do VE está correlacionado com a mortalidade pós operatória e sobrevida.

N Engl J Med Vol 351 (15) Oct 2004. 1539-1546

Severe AR and Left Ventricular Dysfunction

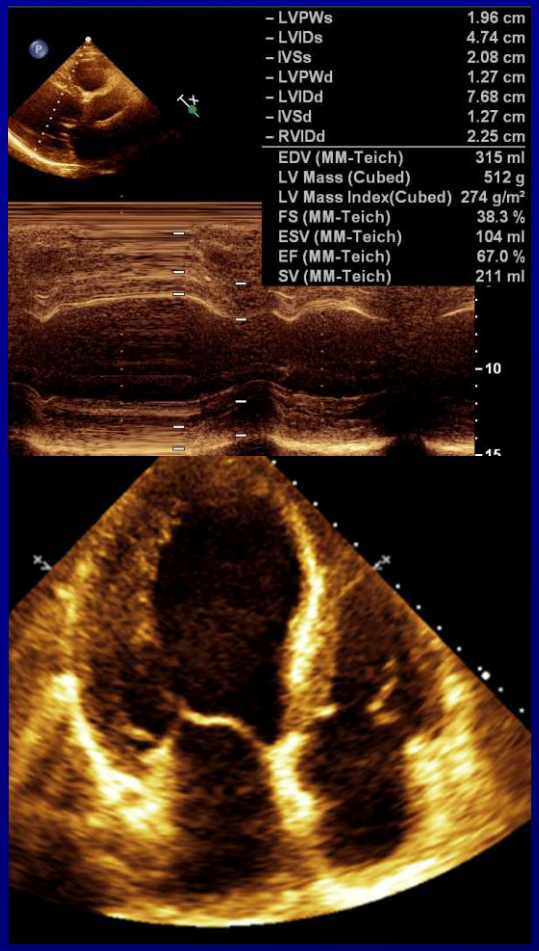
Posoperative Outcome

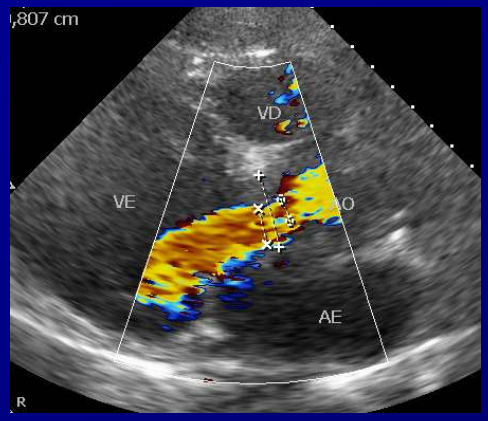
Preoperative Ejection Fraction	Operative Mortality	10-year postoperative survival rate
< 35 % - severe	14.0 %	41 %
35-49 % - moderate / mild	6.7 %	56 %
> 50 % - normal	3.7 %	70 %

N Engl J Med Vol 351 (15) Oct 2004. 1539-1546

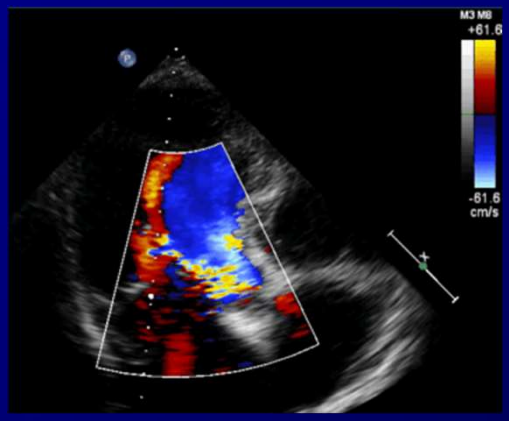
Ecocardiografia e Insuficiência Valvar Aórtica Importante

Avaliação Ecocardiográfica e estudo Doppler

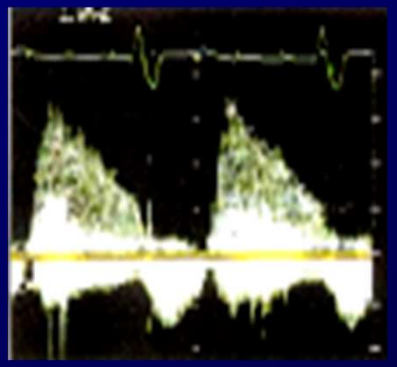




Vena Contracta

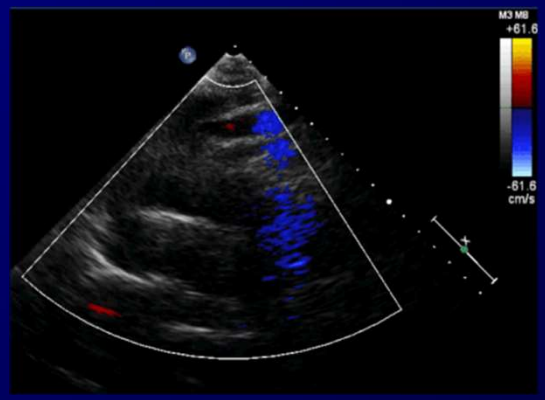


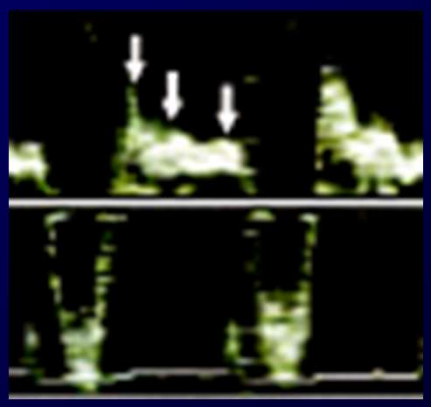
Doppler Color

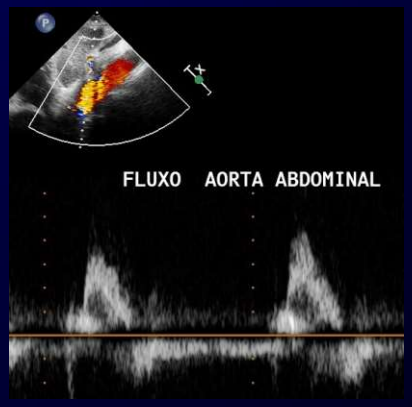


PHT Doppler Continuo

Fluxo Reverso Holodiastólico Aorta Descendente e Abdominal

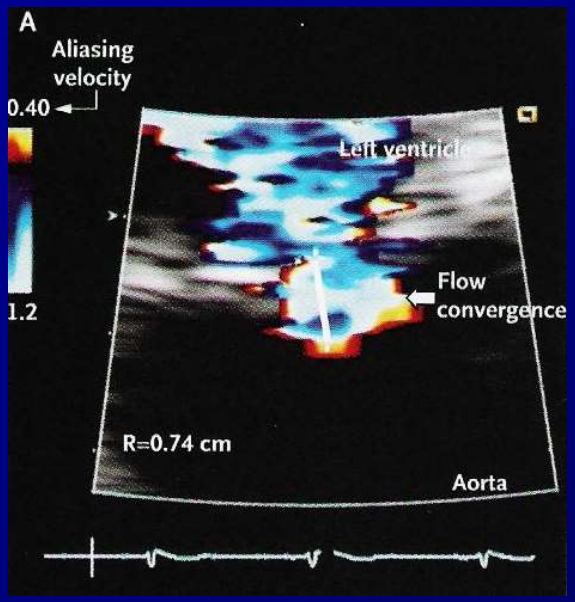


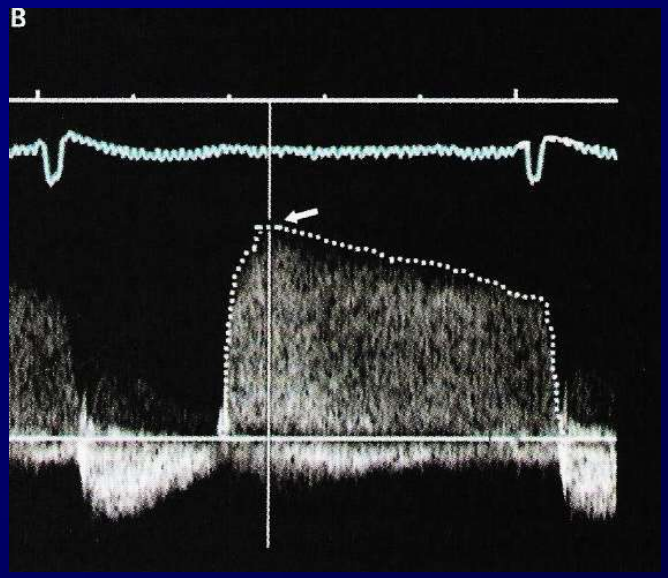




Effective Regurgitant Oriffice in AR

Oriffice = $\frac{\text{Flow}}{\text{Velocity}}$





Flow = $\text{Velocity}_{\text{shell}}$ x PISA

= 0.40 m/seg x $2\pi r^2$

= 40 cm/seg x $2 \times 3{,}1416 \times 0.74^2$

= 138 ml/seg

Velocity = 4.55 m/seg

= 455 cm/seg

Variable	Mild	Moderate		Severe
Effective regurg.orifice (mm^2)	<10	10-19	20-29	>=30

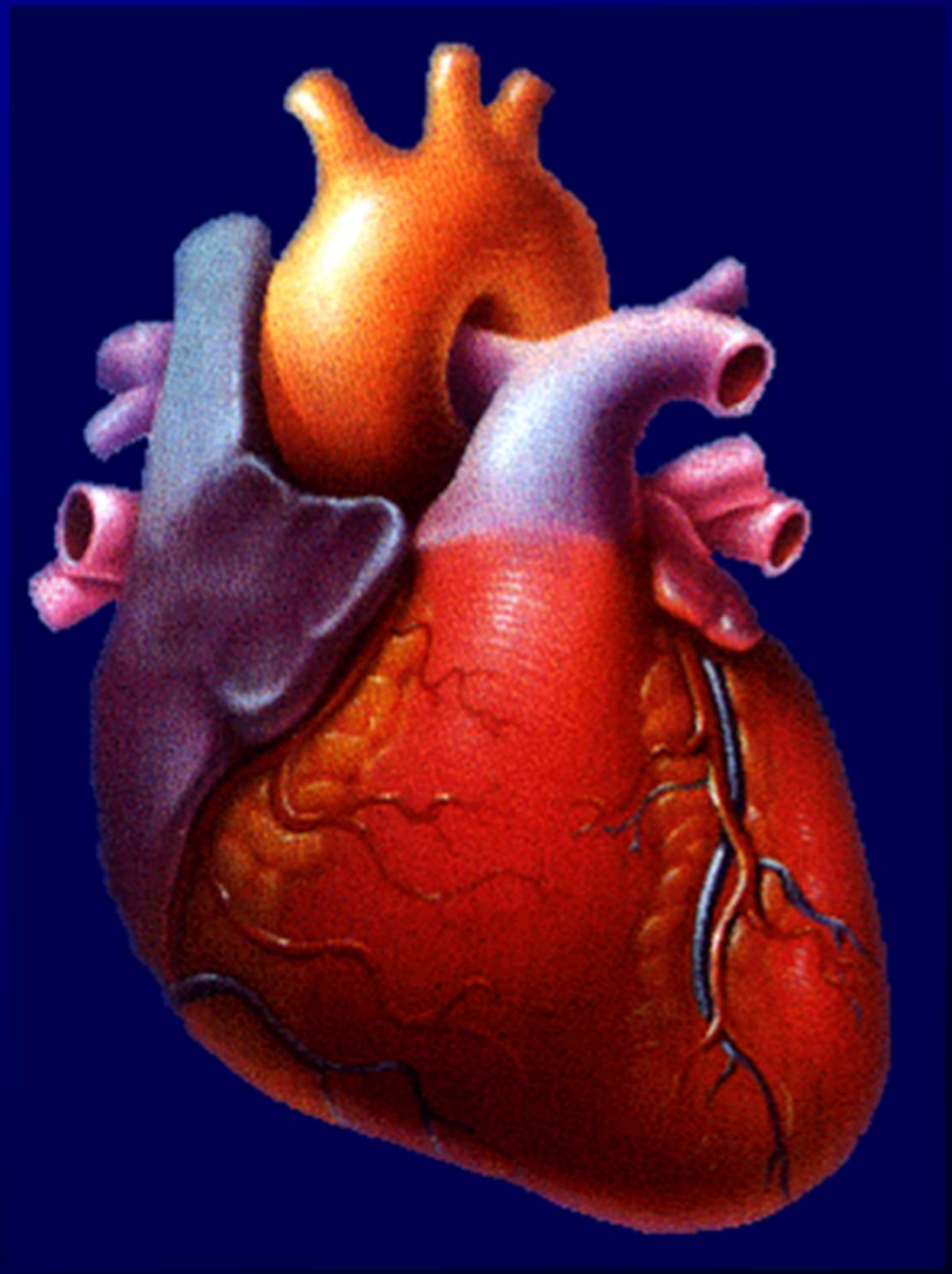
Am Society of Echocardiography 2003;16:777-802

Classification of the Severity of AR

Variable	Mild	Moderate	Severe
• Width vena contracta (mm)	< 3.0	3.0 - 5.9	>= 6.0
• Ratio width AR jet to LV outflow (%)	< 25	25 - 64	>= 65
• Regurgitant volume (ml/beat)	< 30	30 - 59	>= 60
• Regurgitant fraccion (%)	<30	30 - 49	>= 50
• Effective regurg.orifice (mm^2)	<10	10 - 29	>= 30

Am Society of Echocardiography 2003;16:777-802

Estenose Aórtica Importante



Ecocardiografia e Estenose Valvar Aórtica

Etiologia – 95% dos casos

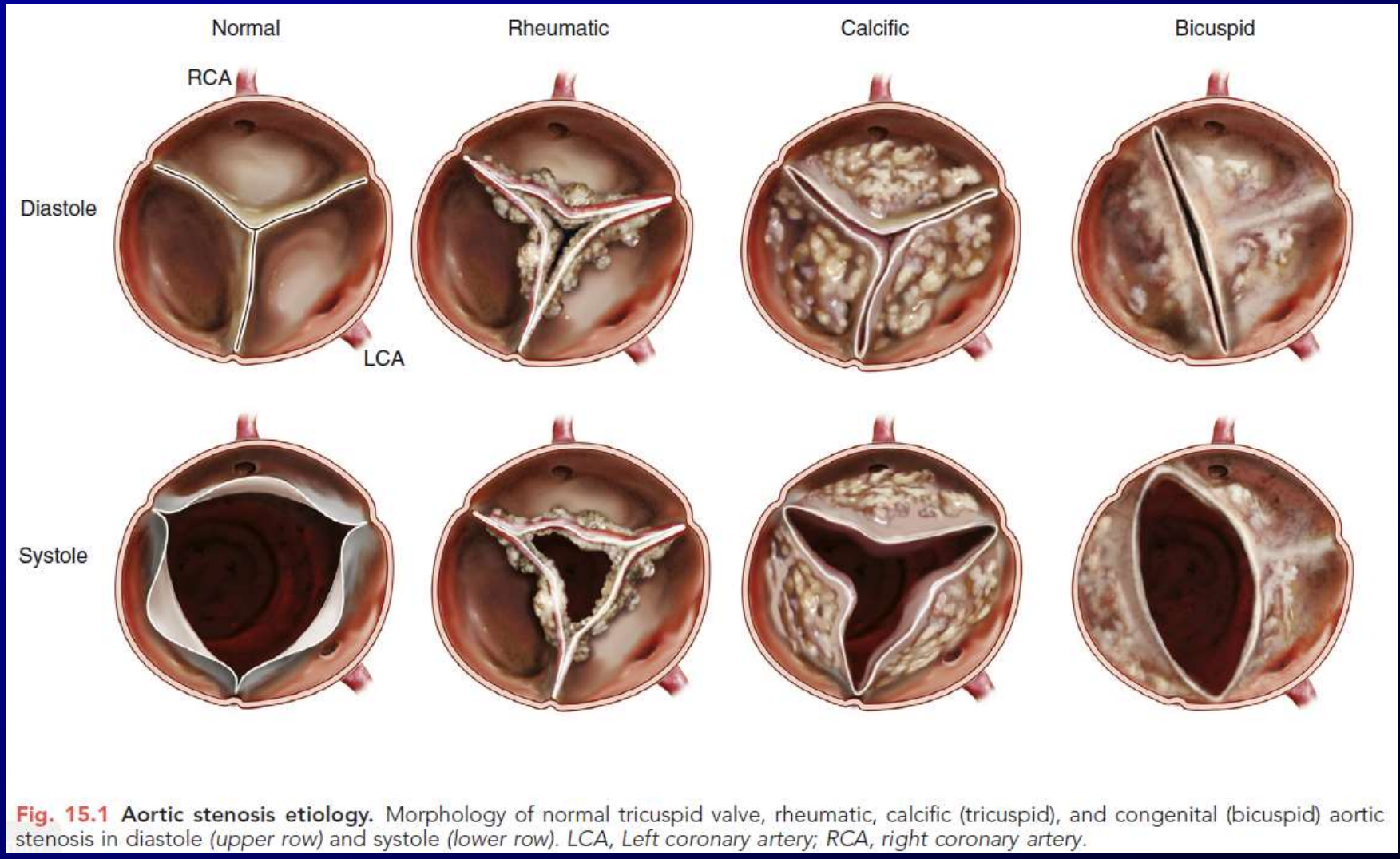


Fig. 15.1 Aortic stenosis etiology. Morphology of normal tricuspid valve, rheumatic, calcific (tricuspid), and congenital (bicuspid) aortic stenosis in diastole *(upper row)* and systole *(lower row)*. *LCA, Left coronary artery; RCA, right coronary artery.*

Valva Aórtica Bicúspide

Orientação: **Antero-Posterior** **Direita-Esquerda** **Esquerda-Direita**

Fusão Cúspide: **Direita-Esquerda** **Direita-Não Coronariana** **Esquerda-Não Coronariana**

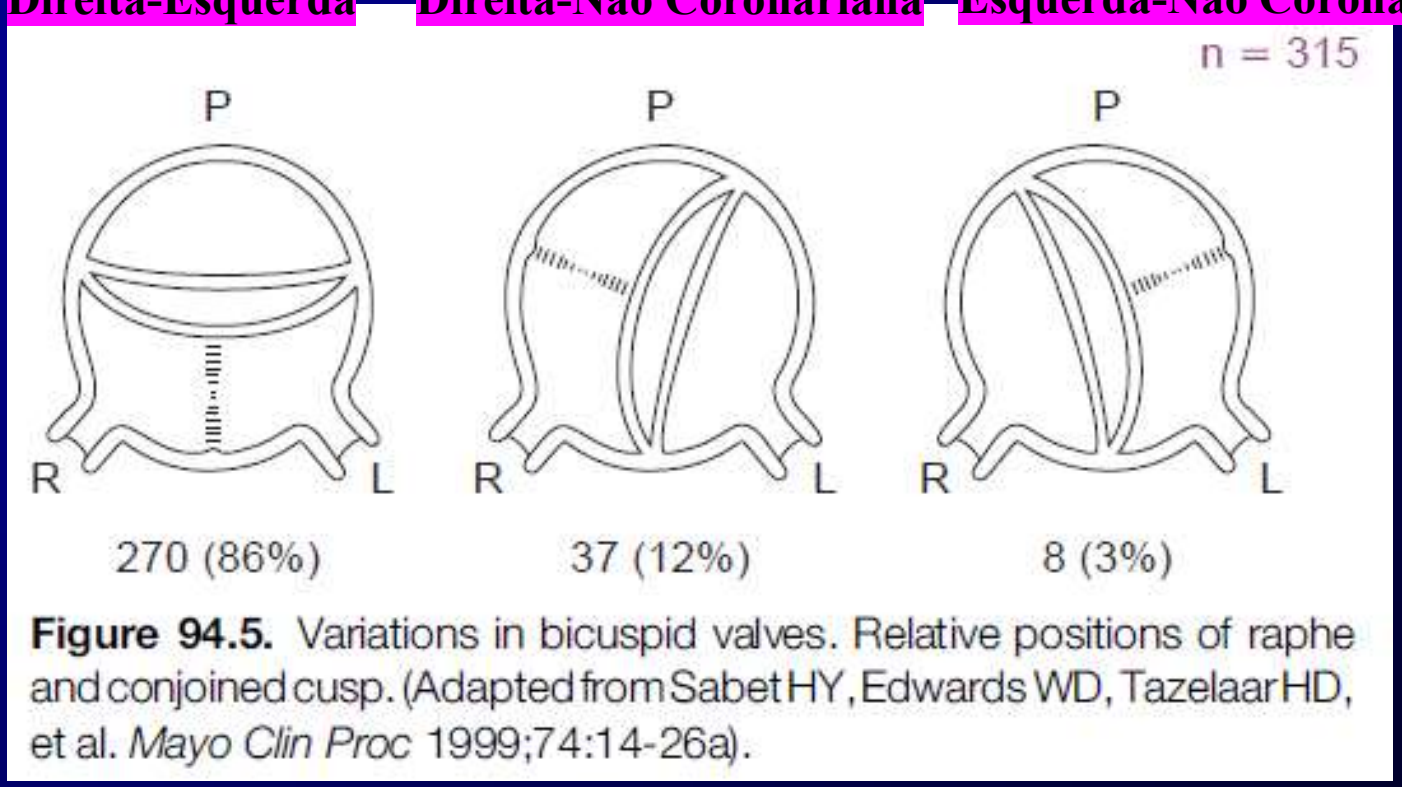


Figure 94.5. Variations in bicuspid valves. Relative positions of raphe and conjoined cusp. (Adapted from Sabet HY, Edwards WD, Tazelaar HD, et al. *Mayo Clin Proc* 1999;74:14-26a).

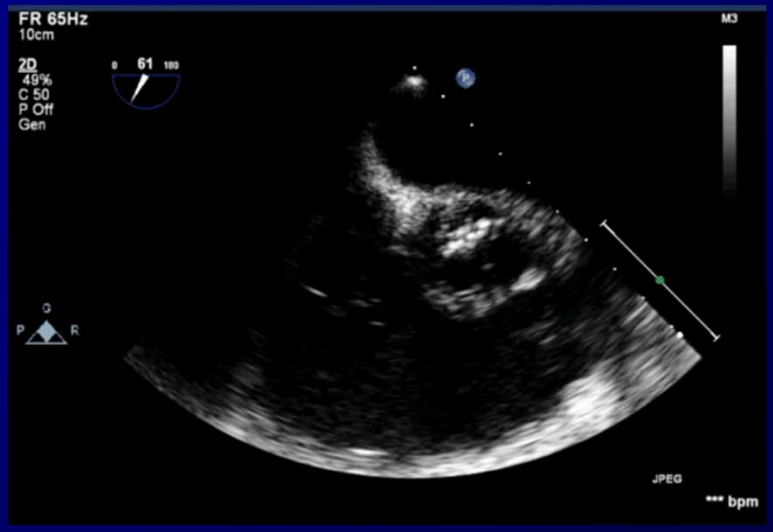
Aortopatia Bicúspide

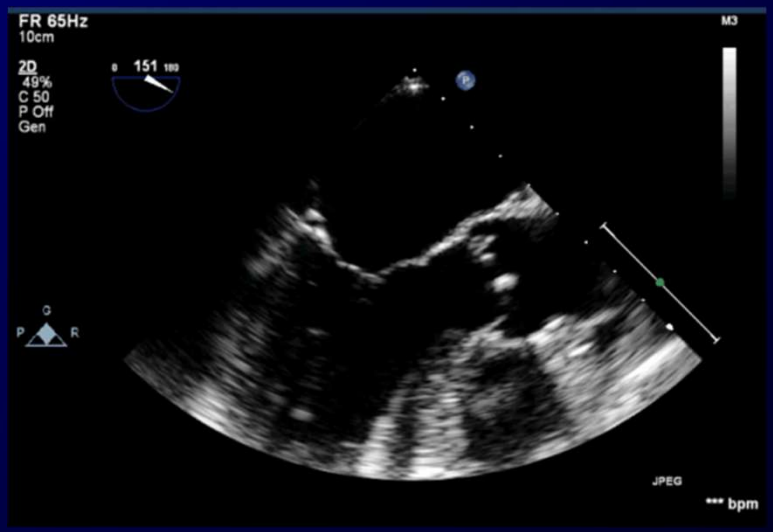
- Tipos
  - Tipo 1 – VAo Bicúspide D-E + EAo + Dilatação Raiz Aorta + Dilatação Tubular Aorta Ascendente + > 50 anos
  - Tipo 2 – VAo Bicúspide D-NC + EAo + Dilatação Aorta Ascendente
  - Tipo 3 – VAo Bicúspide + IAo + Dilatação Raiz Aorta + sexo masculino + < 40 anos
- Maior risco de dissecção e aneurisma

JACC Maio 2014

Ecocardiografia e Estenose Valvar Aórtica

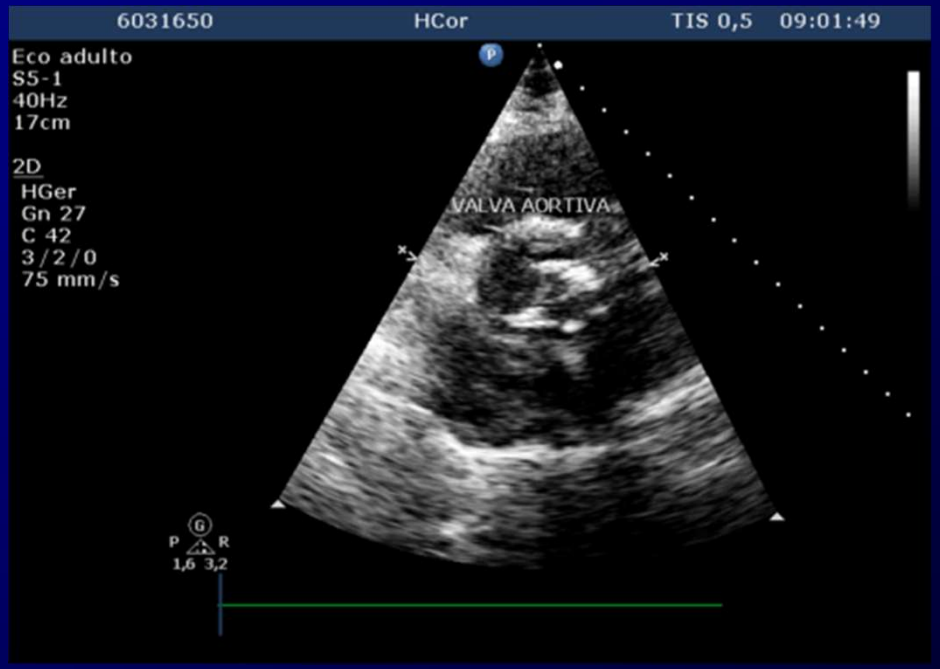
Valva Bicúspide





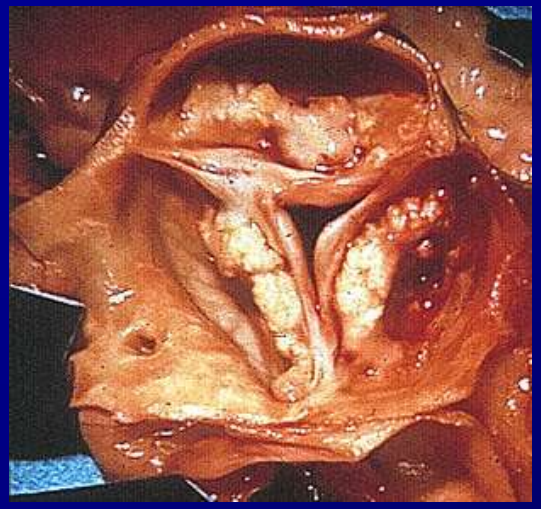
Ecocardiografia e Estenose Valvar Aórtica

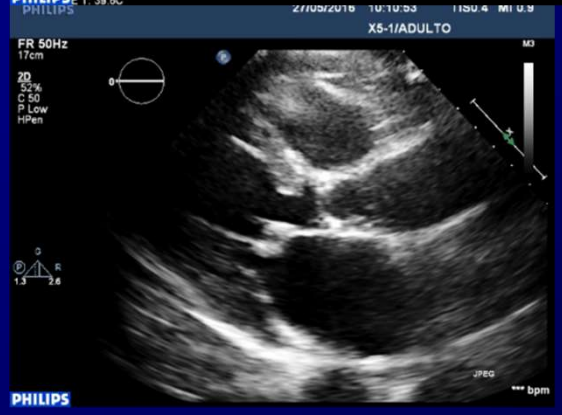
Degenerativa

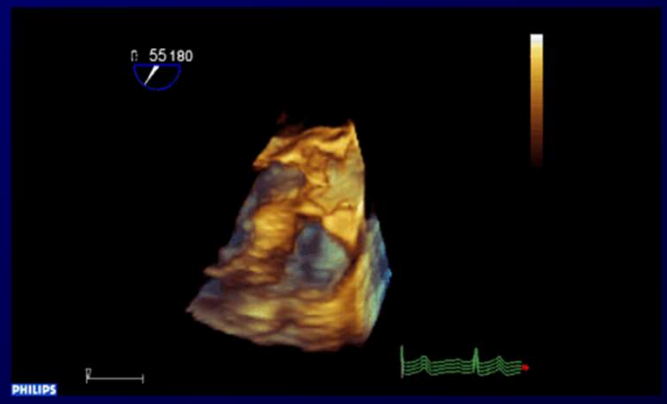


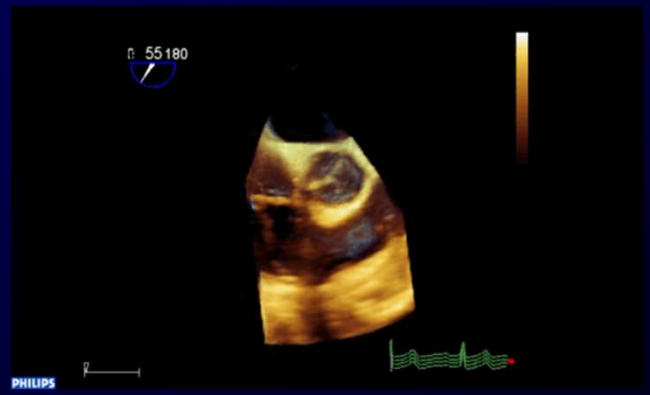
Ecocardiografia e Estenose Valvar Aórtica

Reumática









Ecocardiografia e Estenose Valvar Aórtica

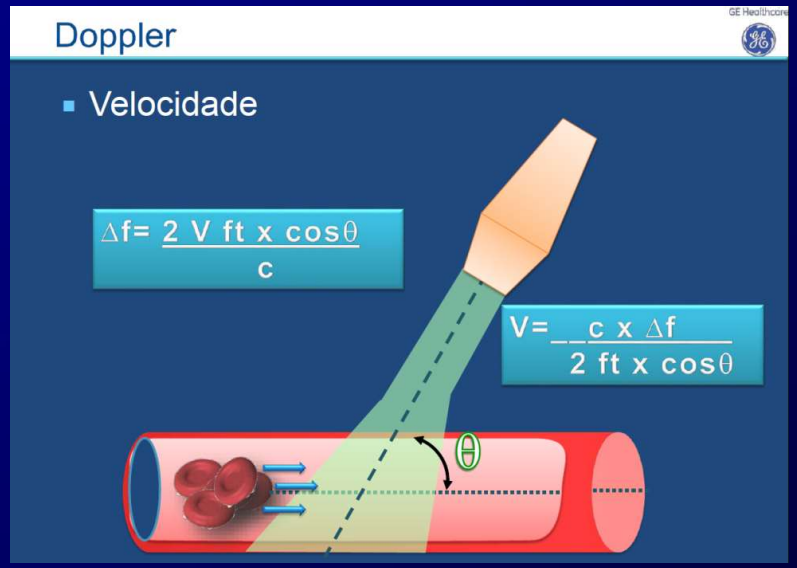
Causas raras de Estenose Valvar Aórtica

- Hipercolesterolemia Tipo II
- Doença de Paget (óssea)
- Insuficiência Renal Crônica
- Exposição a Radiação

Ecocardiografia e Estenose Valvar Aórtica

Velocidade (m/s) e Pressão (mmHg)

Efeito Doppler



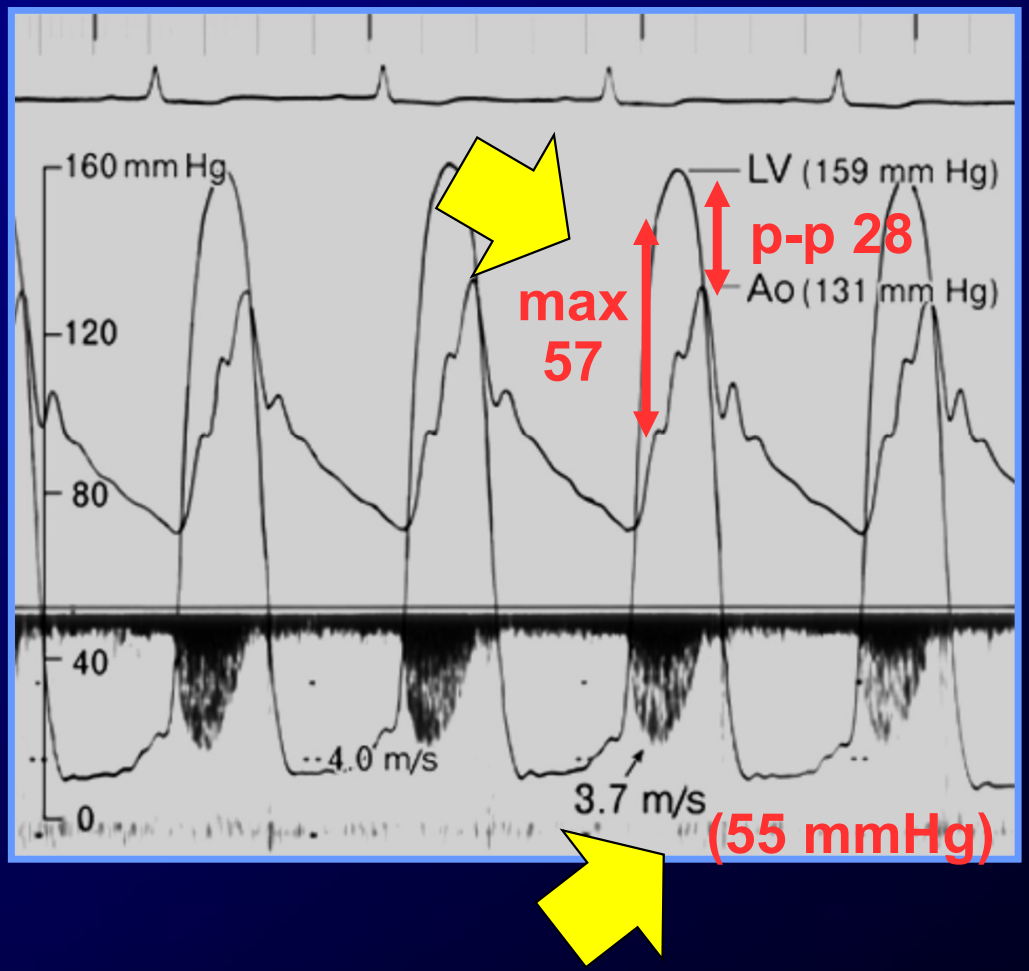
Bernoulli Equation

$$mmHg = 4 \times V^2$$

Gradientes (mmHg) – Cateterismo vs Doppler

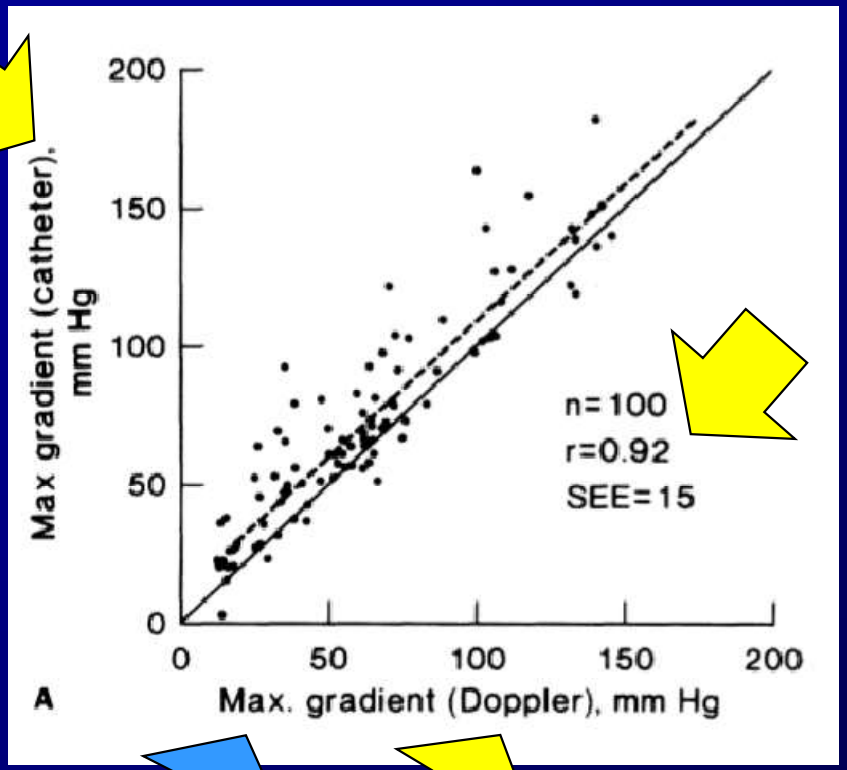
Bernoulli Equation

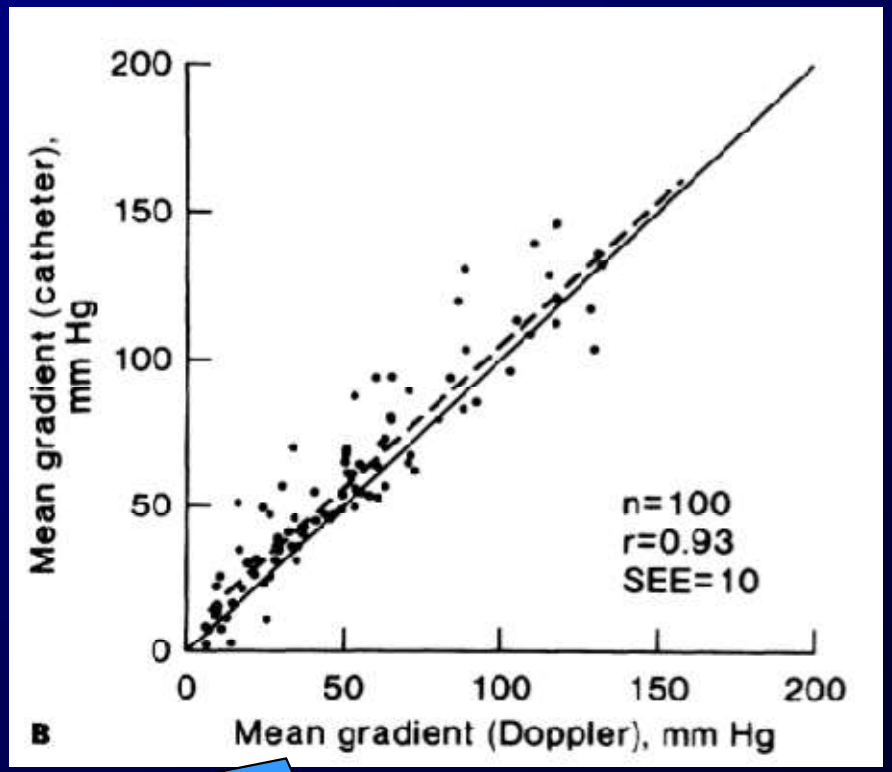
$$PG\ (mmHg) = 4 \times V^2$$



Gradientes (mmHg) – Cateterismo vs Doppler

Continuous-wave Doppler echocardiographic assessment of severity of calcific aortic stenosis: a simultaneous Doppler-catheter correlative study in 100 adult patients.

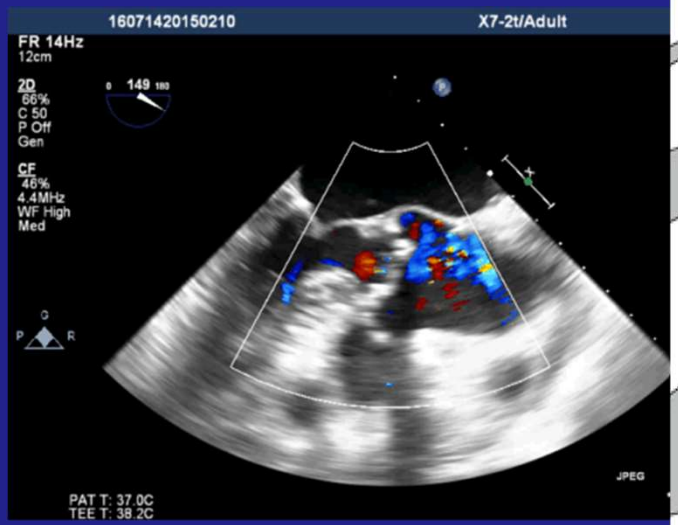


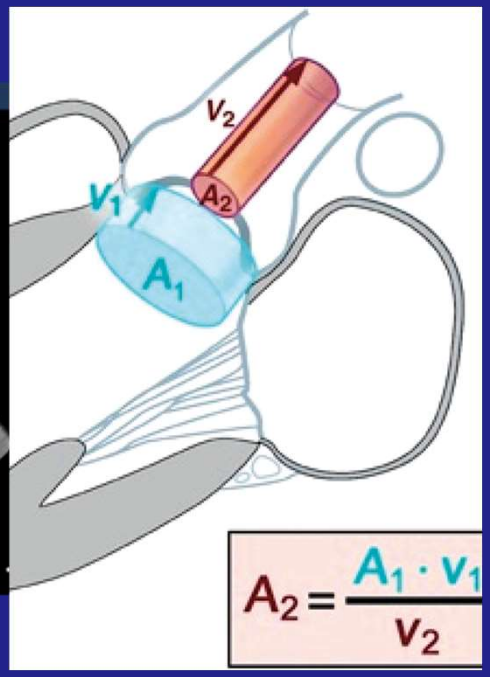


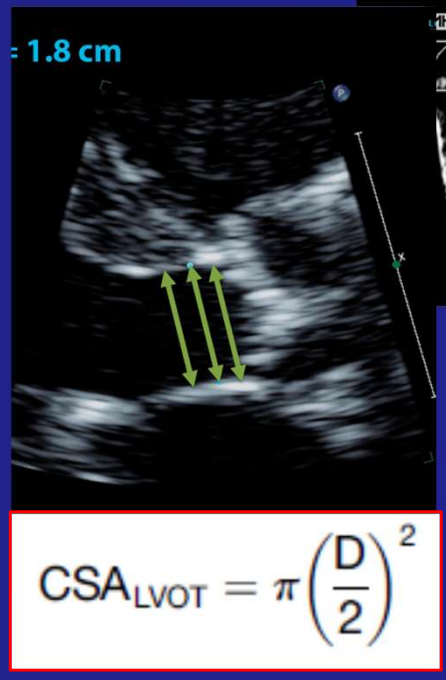
P J Currie, Circulation. 1985;71:1162–1169

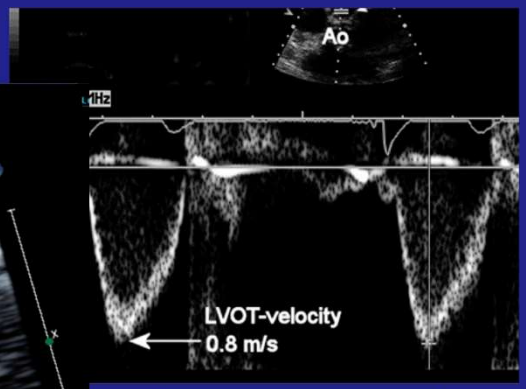
Ecocardiografia e Estenose Valvar Aórtica

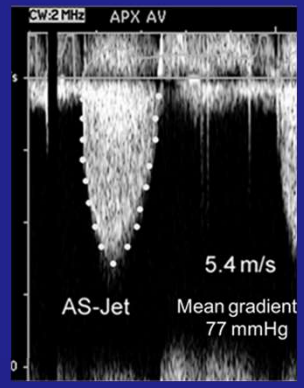
Orifício Efetivo Fluxo (cm^2) - Doppler











Equação de Continuidade

AVA= $(d)^2$ x 0.785 x V1 / V2

Ecocardiografia e Estenose Valvar Aórtica

Orifício Efetivo Fluxo – Cateterismo vs Doppler

Noninvasive estimation of valve area in patients with aortic stenosis by Doppler ultrasound and two-dimensional echocardiography.

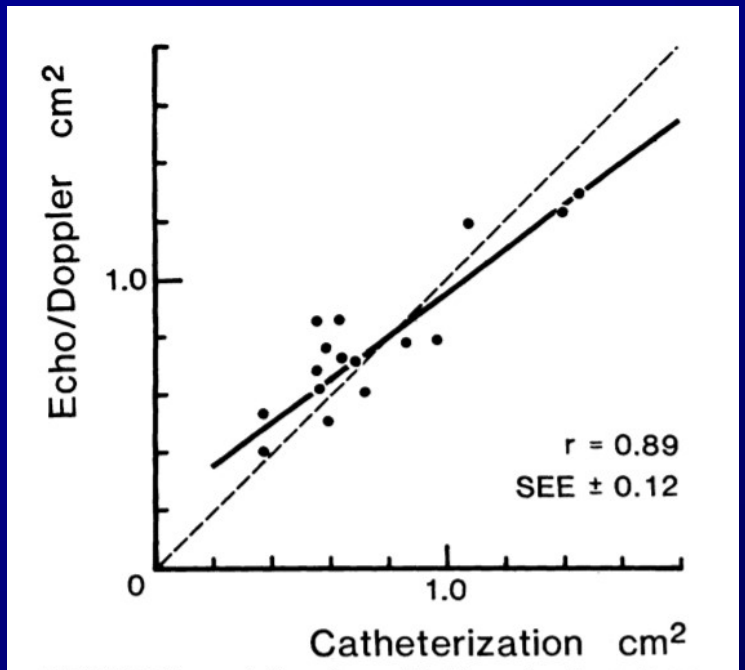


FIGURE 7. Same as in figure 6, except that the noninvasive results are based on peak velocity measurements (equation 2).

Vol. 72, No. 4, October 1985

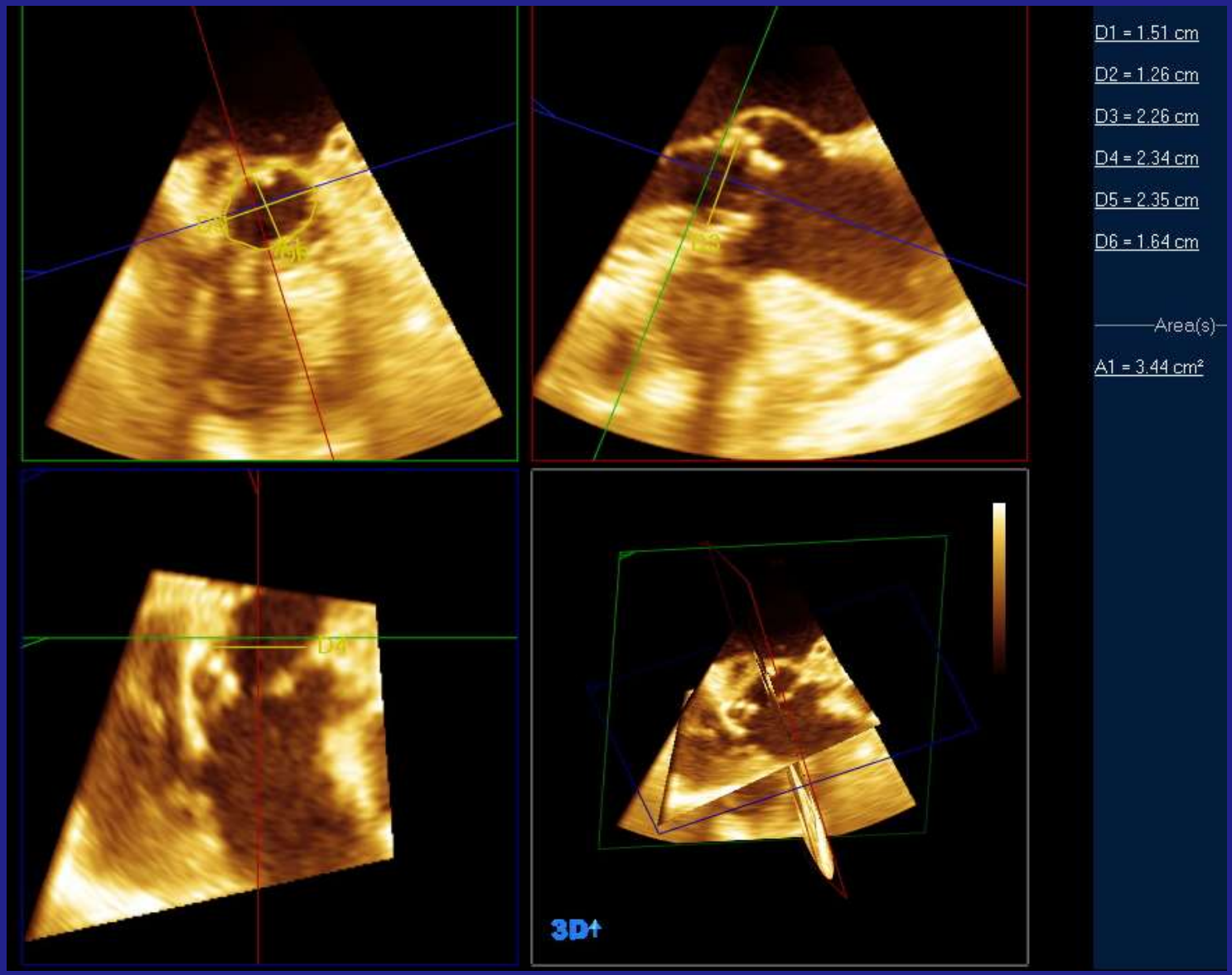
Gorlin formula

$$AVA = \frac{\text{Cardiac output}}{(\text{Systolic ejection period} \times \text{Heart rate})} \Big/ 44.3 \sqrt{(\text{Mean gradient})}$$

The AVA is 0.80cm²; this can be determined from the Gorlin formula using the transaortic volume flow rate and mean pressure gradient. 44.3 is the valve constant.

T Skjaerpe, L Hegrenaes, and L Hatle,, Circulation. 1985;72:810–818

Área da via de saída VE – 3D TE



Severidade Hemodinâmica

	NORMAL	DISCRETA	MODERADA	IMPORTANTE
Vel. Máx (m/seg)	<= 2,5	2,6 - 2,9	3,0 - 4,0	>= 4,0
Gd.Médio (mmHg)	-	< 20	20 - 40	>= 40
Área (cm^2)	> 3,0 cm^2	> 1,5	1,0 - 1,5	< 1,0
Área indexada (cm^2/m^2)		> 0,85	0,60 - 0,85	< 0,6
Indice Velocidade (V1/V2)		> 0,50	0,25 - 0,50	< 0,25

Journal of the American Society of Echocardiography April 2017

Categorias hemodinâmicas - EAo importante

- **Gradiente elevado:**
  - Area valvar < 1 cm^2
  - Gradiente médio > 40 mmHg
  - Significa EAo importante independ. da FE ou do fluxo ser normal ou diminuído.

- **Baixo fluxo e baixo gradiente com FE diminuída:**
  - Area valvar < 1,0 cm^2
  - Gradiente médio < 40 mmHg
  - FE < 50%
  - Índice de volume sistólico < 35 ml/m^2
  - Está indicado dobutamina baixa dose :
    - ✓ EAo verdadeira (< 1,0 cm^2 e > 40 mmHg) vs pseudo (>1,0cm^2 e < 40 mmHg)
    - ✓ Aval. Reserva Contrátil > ou < 20% do volume sistólico VE (implicação Px)

Dobutamine Echocardiography in Severe Aortic Stenosis with Low Aortic Pressure Gradient

Low cardiac output
Low pressure gradient
EF < 50%

Baseline Doppler hemodynamics:
AVA=<=1.0cm^2
LVOT:Ao TVI <=0.25

True Anatomically Severe AS

Functionally Pseudo-severe AS

Dobutamine stress
up to 20 ug/kg/min

↑↑ **Gradient**
←↓ **AV area**

↑ **Gradient**
↑ **AV area**

Protocolo Baixa Dose Dobutamina

Starting dobutamine dose of 2.5 to 5 mcg/kg/min

Increase dose 2.5 to 5 mcg/kg/min every 3-5 minutes

Maximum dobutamine dose of 20 mcg/kg/min

Infusion stopped when:

1) Maximum dobutamine dose reached (20 mcg/kg/min)
2) Positive result obtained
3) Heart rate rises 10-20 bpm over baseline or exceeds 100 bpm
4) Symptoms, blood pressure fall, or significant arrhythmias

Positive Result:

- An increase in effective AVA to a final valve area >1.0 cm2 suggests that stenosis is not severe [47].
- Severe stenosis is suggested by an AS jet velocity ≥4.0 m/s or a mean gradient > 30-40 mmHg provided that valve area does not exceed 1.0 cm^2 at any flow rate [50,51].
- Absence of contractile reserve (failure to increase SV by >20%) is a predictor of a high surgical mortality and poor long-term outcome although valve replacement may improve LV function and outcome even in this subgroup [52].

Journal of the American Society of Echocardiography 2017 30372-392DOI: (10.1016/j.echo.2017.02.009)

Categorias hemodinâmicas - EAo importante

- **Baixo fluxo e baixo gradiente com FE preservada:**
  - Area valvar < 1 cm^2
  - Gradiente médio < 40 mmHg
  - FE >= 50%
  - Índice de volume sistólico <= 35 ml/m^2
  - Típico do idoso com VE pequeno e marcada HVE e histórico de HAS
  - Significa desafio para o ecocardiografista e exclusão de erros de medição
  - Significa complementação - escore de cálcio CT multislice > 2000 H >1200 M
- **Fluxo normal e baixo gradiente com FE preservada:**
  - Area valvar < 1,0 cm^2
  - Gradiente médio < 40 mmHg
  - FE >= 50%
  - Índice de volume sistólico > 35 ml/m^2
  - Significa que geralmente o paciente tem estenose moderada

Estenose Valvar Aórtica e Escore de Cálcio

Table 6 Criteria that increase the likelihood of severe aortic stenosis in patients with AVA <1.0 cm^2 and mean gradient <40 mmHg in the presence of preserved ejection fraction (modified from Baumgartner *et al.*[4])

Criteria	
Clinical criteria	• Typical symptoms without other explanation • Elderly patient (>70 years)
Qualitative imaging data	• LV hypertrophy (additional history of hypertension to be considered) • Reduced LV longitudinal function without other explanation
Quantitative imaging data	• Mean gradient 30–40 mmHg[a]
	• AVA ≤0.8 cm^2
	• Low flow (SVi <35 mL/m^2) confirmed by techniques other than standard Doppler technique (LVOT measurement by 3D TOE or MSCT; CMR, invasive data)
	• Calcium score by MSCT[b] Severe aortic stenosis very likely: men ≥3000; women ≥1600 Severe aortic stenosis likely: men ≥2000; women ≥1200 Severe aortic stenosis unlikely: men <1600; women <800

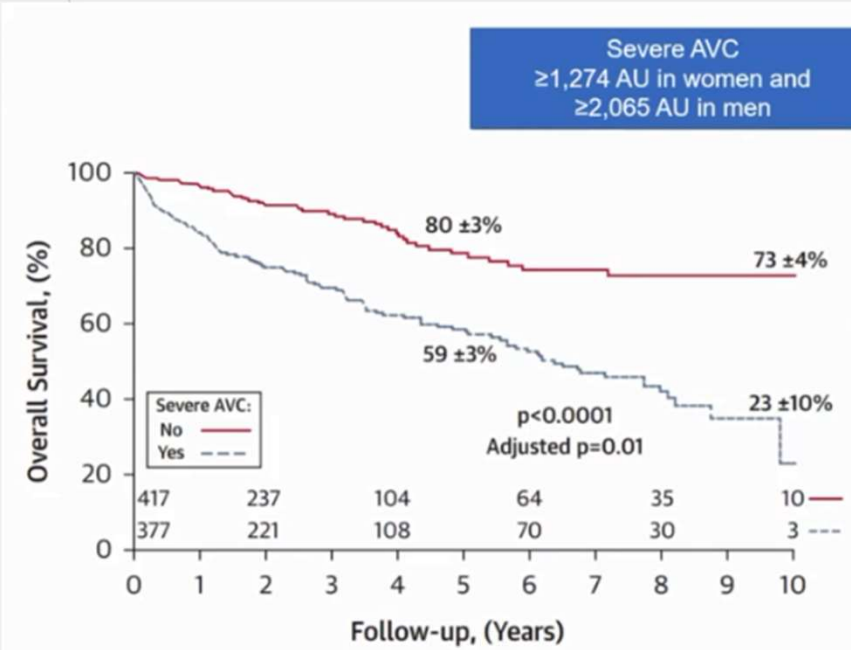
3D = three-dimensional; AVA = aortic valve area; CMR = cardiovascular magnetic resonance; LV = left ventricular; LVOT = left ventricular outflow tract; MSCT = multislice computed tomography; SVi = stroke volume index; TOE = transoesophageal echocardiography.

[a]Haemodynamics measured when the patient is normotensive.

[b]Values are given in arbitrary units using Agatston method for quantification of valve calcification.

Estenose Valvar Aórtica e Escore Cálcio

Advances in the management of aortic stenosis



Measuring AVC load provides ***incremental prognostic value*** for survival beyond clinical and Doppler echocardiographic assessment.
Severe AVC independently predicts excess mortality after AS diagnosis.

Erwan Donal
France

EACVI - Best of Imaging 2020

Clavel et al. J Am Coll Cardiol 2014;64: 1202 - 1213

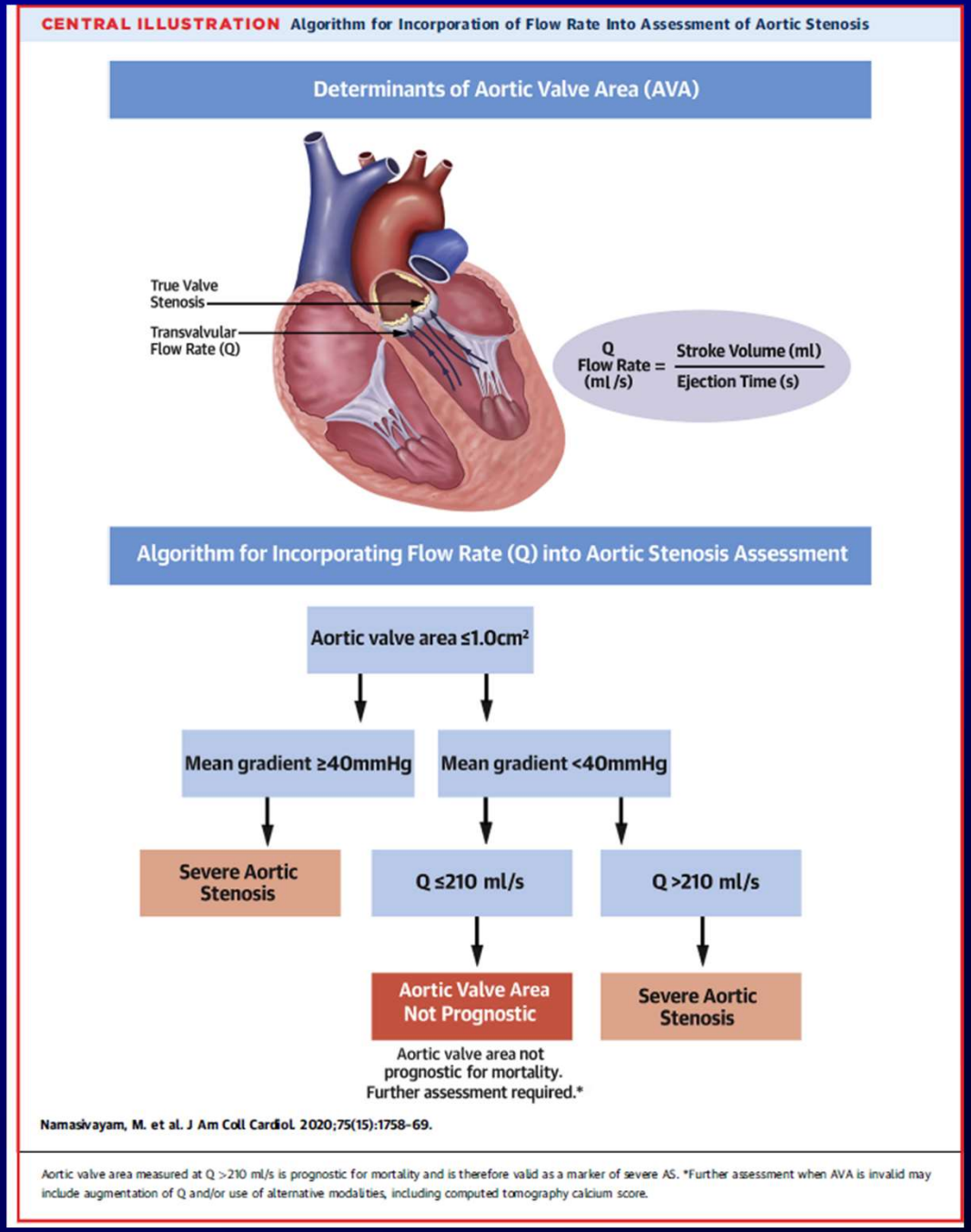
#EACVIBestOf2020

Estenose Valvar Aórtica e Indicação Cirúrgica

Indicaciones de cirugía en la Estenosis Aórtica

- EA severa y sintomas
- EA severa asintomática con prueba de esfuerzo anormal (síntomas o caída de la TA)
- EA severa asintomåtica con válvula calcificada y evidencia de progresión (>0.3 m/s) en ecocardiogramas sucesivos
- EA severa asintomática con disfunción sistólica no atribuible a otras causas
- EA asintomática crítica (velocidad > 5 m/seg o gradiente medio >60 mm Hg)
- EA moderada o severa en pacientes que precisan cirugía coronaria o mitral
- EA con bajo gradiente, disfunción sistólica y presencia de reserva contráctil

Flow Rate

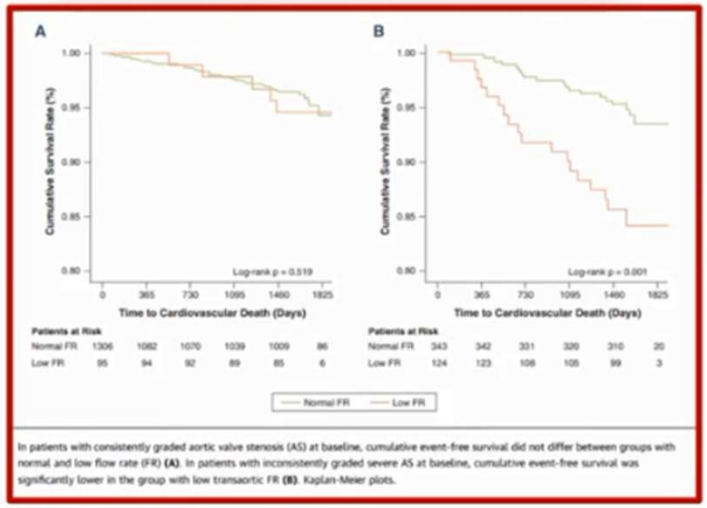

CENTRAL ILLUSTRATION Algorithm for Incorporation of Flow Rate Into Assessment of Aortic Stenosis
Determinants of Aortic Valve Area (AVA)
True Valve Stenosis
Transvalvular Flow Rate (Q)
Q Flow Rate (ml/s) = Stroke Volume (ml) / Ejection Time (s)
Algorithm for Incorporating Flow Rate (Q) into Aortic Stenosis Assessment
Aortic valve area ≤1.0cm²
Mean gradient ≥40mmHg
Mean gradient <40mmHg
Severe Aortic Stenosis
Q ≤210 ml/s
Q >210 ml/s
Aortic Valve Area Not Prognostic
Severe Aortic Stenosis
Aortic valve area not prognostic for mortality. Further assessment required.*
Namasivayam, M. et al. J Am Coll Cardiol. 2020;75(15):1758-69.
Aortic valve area measured at Q >210 ml/s is prognostic for mortality and is therefore valid as a marker of severe AS. *Further assessment when AVA is invalid may include augmentation of Q and/or use of alternative modalities, including computed tomography calcium score.

Flow Rate

Advances in the management of aortic stenosis

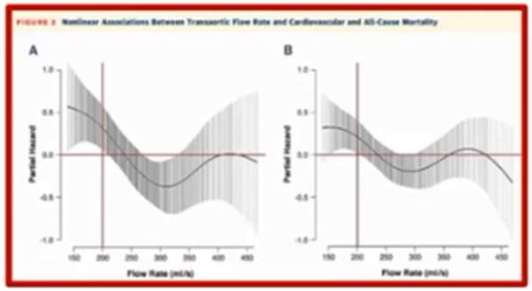
Lower Transaortic Flow Rate Is Associated With Increased Mortality in Aortic Valve Stenosis

Sahrai Saeed, MD, PhD,[1] Roxy Senior, MD,[1] Navtej S. Chahal, MBBS, PhD,[1] Mai Tone Lønnebakken, MD, PhD,[1,2] John B. Chambers, MD, PhD,[1] Edda Bahlmann, MD, PhD,[1] Eva Gerdts, MD, PhD[1]



In patients with consistently graded aortic valve stenosis (AS) at baseline, cumulative event-free survival did not differ between groups with normal and low flow rate (FR) **(A)**. In patients with inconsistently graded severe AS at baseline, cumulative event-free survival was significantly lower in the group with low transaortic FR **(B)**. Kaplan-Meier plots.

Flow rate : GREAT for inconsistently graded severe AS



200ml/s

Erwan Donal
France

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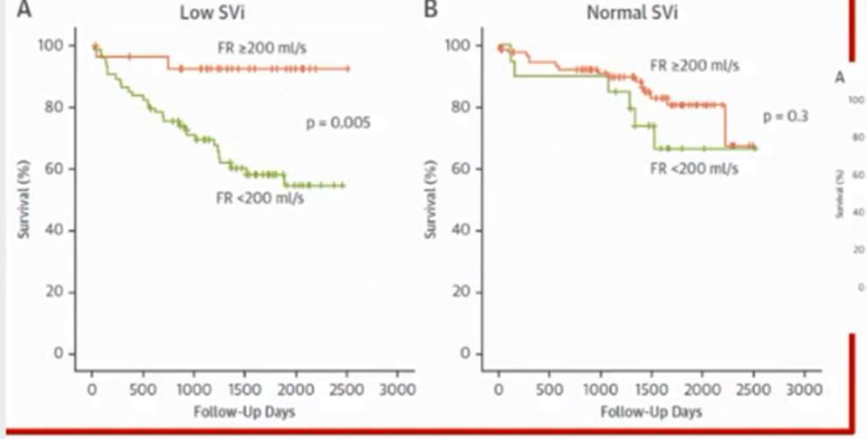
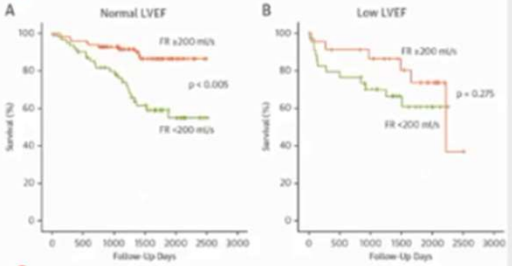
J Am Coll Cardiol Img 2017;10:912–20

Flow Rate

Low Transvalvular Flow Rate Predicts Mortality in Patients With Low-Gradient Aortic Stenosis Following Aortic Valve Intervention





218 patients with mean age 75 12 years, 102 (46.8%) had low stroke volume index (SVi) (<35 ml/m2), 95 (43.6%) had low FR (<200 ml/s), and 58 (26.6%) had low left ventricular ejection fraction <50%.

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J Am Coll Cardiol Img 2019;12:1715–24

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Estenose Valvar Aórtica e Strain Global Longitudinal

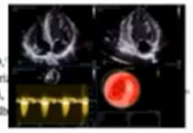
Advances in the management of aortic stenosis

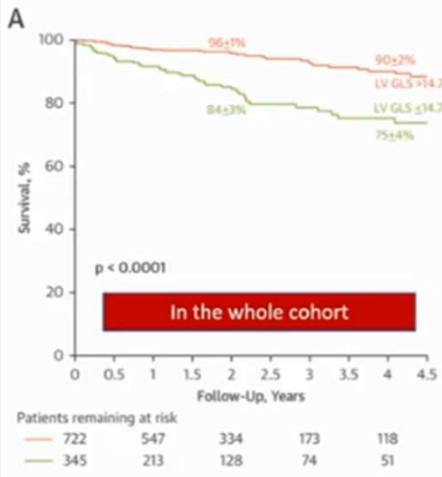
1067 asymptomatic patients with significant AS and LVEF >50%

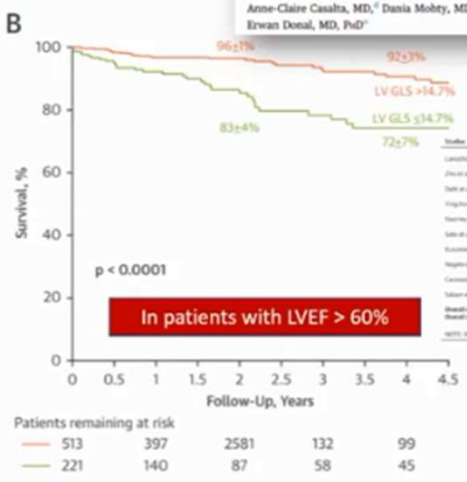
Risk of death for patients with LVGLS ≤ 14.7% x 2.5

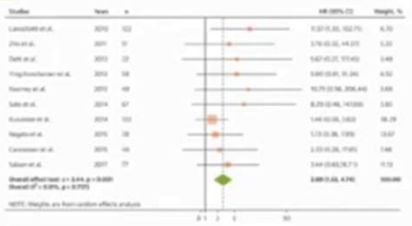
Distribution and Prognostic Significance of Left Ventricular Global Longitudinal Strain in Asymptomatic Significant Aortic Stenosis

An Individual Participant Data Meta-Analysis









J Am Coll Cardiol Img 2019;12:84–92

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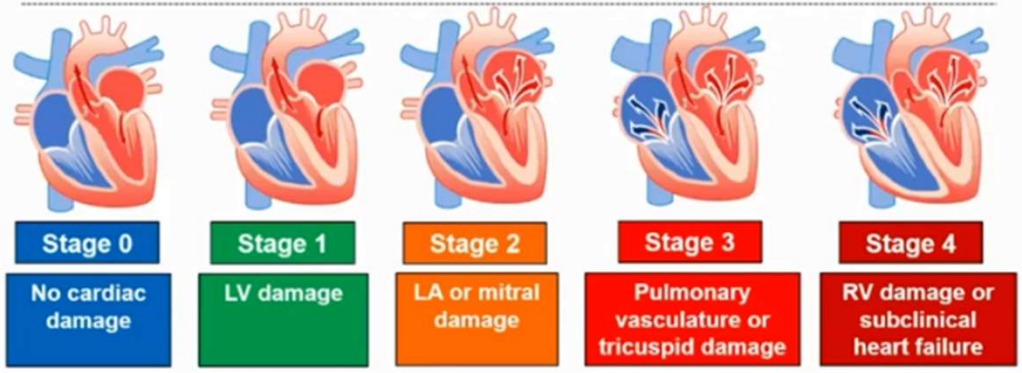
Estenose Valvar Aórtica e Dano Miocárdico

Advances in the management of aortic stenosis

CARDIAC DAMAGE STAGING CLASSIFICATION



Stage 0	Stage 1	Stage 2	Stage 3	Stage 4
No cardiac damage	LV damage	LA or mitral damage	Pulmonary vasculature or tricuspid damage	RV damage or subclinical heart failure
	○ LV hypertrophy ○ LV diastolic dysfunction ≥grade II ○ Impaired LV longitudinal strain ≤ 15% ○ LV ejection fraction <60%	○ LA volume >34 ml/m² ○ Mitral regurgitation ≥ moderate ○ Atrial fibrillation	○ Pulmonary hypertension >60 mmHg ○ Tricuspid regurgitation ≥ moderate	○ RV systolic dysfunction ≥moderate ○ Moderate to severe low-flow (stroke volume index <30 ml/m²)

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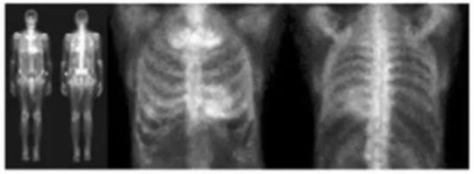
Estenose Valvar Aórtica e Amiloidose

Advances in the management of aortic stenosis

ESC — CLINICAL RESEARCH

Unveiling transthyretin cardiac amyloidosis and its predictors among elderly patients with severe aortic stenosis undergoing transcatheter aortic valve replacement

Adam Castaño, David L. Narotsky, Nadira Hamid, Omar K. Khalique, Rachelle Morgenstern, Albert DeLuca, Jonah Rubin, Codruta Chiuzan, Tamim Nazif, Torsten Vahl, Isaac George, Susheel Kodali, Martin B. Leon, Rebecca Hahn, Sabahat Bokhari, and Mathew S. Maurer



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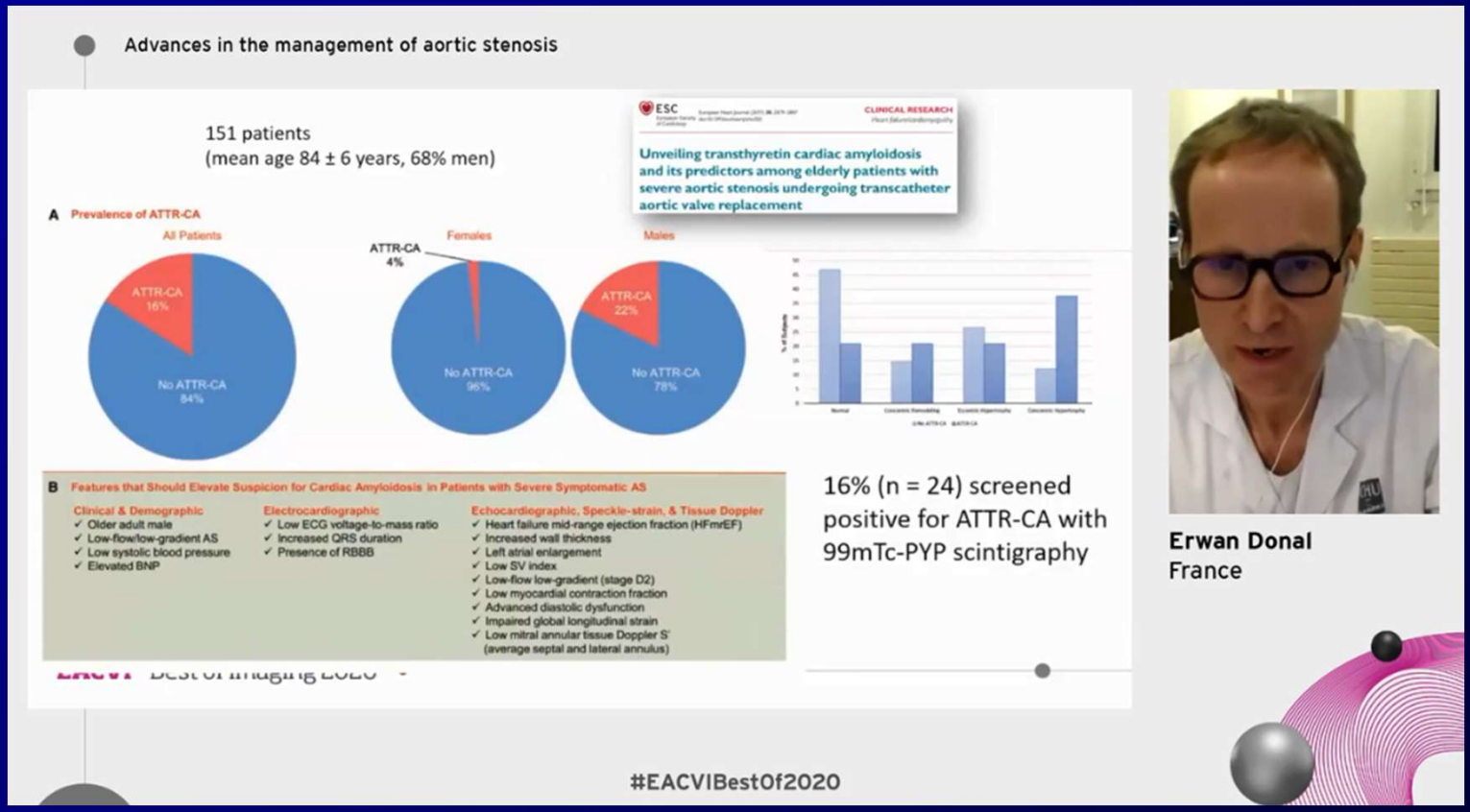
Estenose Valvar Aórtica e Amiloidose



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Estenose Valvar Aórtica e Amiloidose

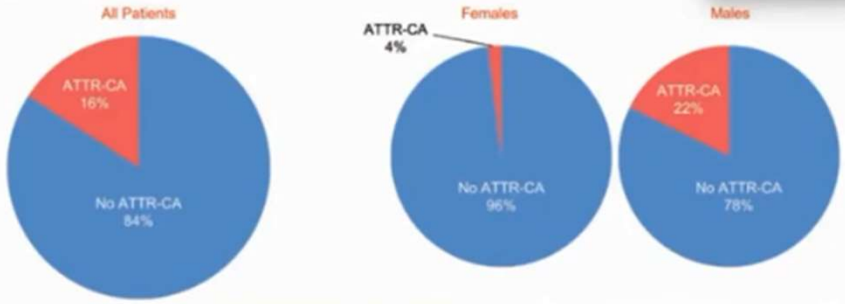
Advances in the management of aortic stenosis

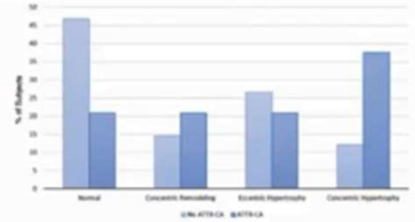
151 patients
(mean age 84 ± 6 years, 68% men)

ESC CLINICAL RESEARCH

Unveiling transthyretin cardiac amyloidosis and its predictors among elderly patients with severe aortic stenosis undergoing transcatheter aortic valve replacement

A Prevalence of ATTR-CA





B Features that Should Elevate Suspicion for Cardiac Amyloidosis in Patients with Severe Symptomatic AS

Clinical & Demographic	Electrocardiographic	Echocardiographic, Speckle-strain, & Tissue Doppler
✓ Older adult male	✓ Low ECG voltage-to-mass ratio	✓ Heart failure mid-range ejection fraction (HFmrEF)
✓ Low-flow/low-gradient AS	✓ Increased QRS duration	✓ Increased wall thickness

16% (n = 24) screened positive for ATTR-CA with

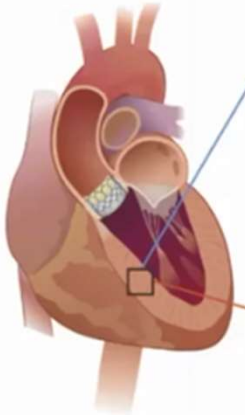
- Transthyretin cardiac amyloidosis is prevalent in 16% of patients with severe calcific AS undergoing TAVR
- Associated with a severe AS-phenotype of low-flow low-gradient with mildly reduced ejection fraction.

Erwan Donal
France

Estenose Valvar Aórtica e RNM -T1

Advances in the management of aortic stenosis

CENTRAL ILLUSTRATION T1 Mapping Assessments of Myocardial Fibrosis in Aortic Stenosis

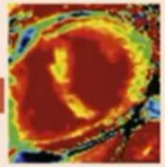


Myocardial Fibrosis

Key driver of left ventricular (LV) decompensation in aortic stenosis and the transition from hypertrophy to heart failure

Cardiovascular Magnetic Resonance T1 Mapping

Multicenter study of 440 patients with severe aortic stenosis awaiting valve replacement who underwent CMR with T1 Mapping



Extracellular Volume Fraction (ECV%)

ECV% detects and quantifies reversible diffuse myocardial fibrosis

ECV% is associated with multiple markers of LV decompensation including symptomatic status, atrial volume, LV mass, and lower ejection fraction

ECV% is a powerful independent predictor of long-term clinical outcomes

↑ All-cause mortality independent of age, sex, late gadolinium enhancement, peak velocity, and ejection fraction

↑ Cardiovascular mortality

Everett, R.J. et al. J Am Coll Cardiol. 2020;75(3):304-16.

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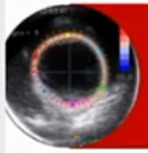
France

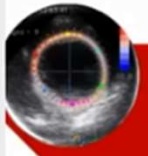
Estenose Valvar Aórtica e Imagem Cardíaca

Advances in the management of aortic stenosis

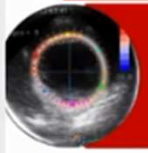
Cardiac imaging for aortic valve stenosis



Look at the valve & Look at the heart damages



Vmax, Mean Pressure Gradient, AVA <u>but also</u> flow and flow rate, LVEF, GLS



Additive value of CT-calcium Scoring (gender issue);
value of T1-mapping and not only LGE

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Erwan Donal
France

Estenose Valvar Aórtica no Bienio 2019-2020

Advances in the management of aortic stenosis

Summary

- 1. Coexistence of cardiac amyloid in AS referred for TAVR
  - 13-16% incidence; outcomes better with TAVR than medical therapy
- 2. Prognostic importance of Flow rate in severe AS
- 3. Intermediate risk SAVR vs TAVR for AS:5 year outcome
  - no difference in death or disabling stroke; however TAVR had higher paravalvular leak, rehospitalization rates and reintervention rates
- 4. Low Risk SAVR vs TAVR for AS:2 year outcome; presented at ACC 2020
  - No difference in primary endpoint of death, disabling stroke or rehospitalization; TAVR: increased valve thrombosis at 2 yr

Judy Hung
USA

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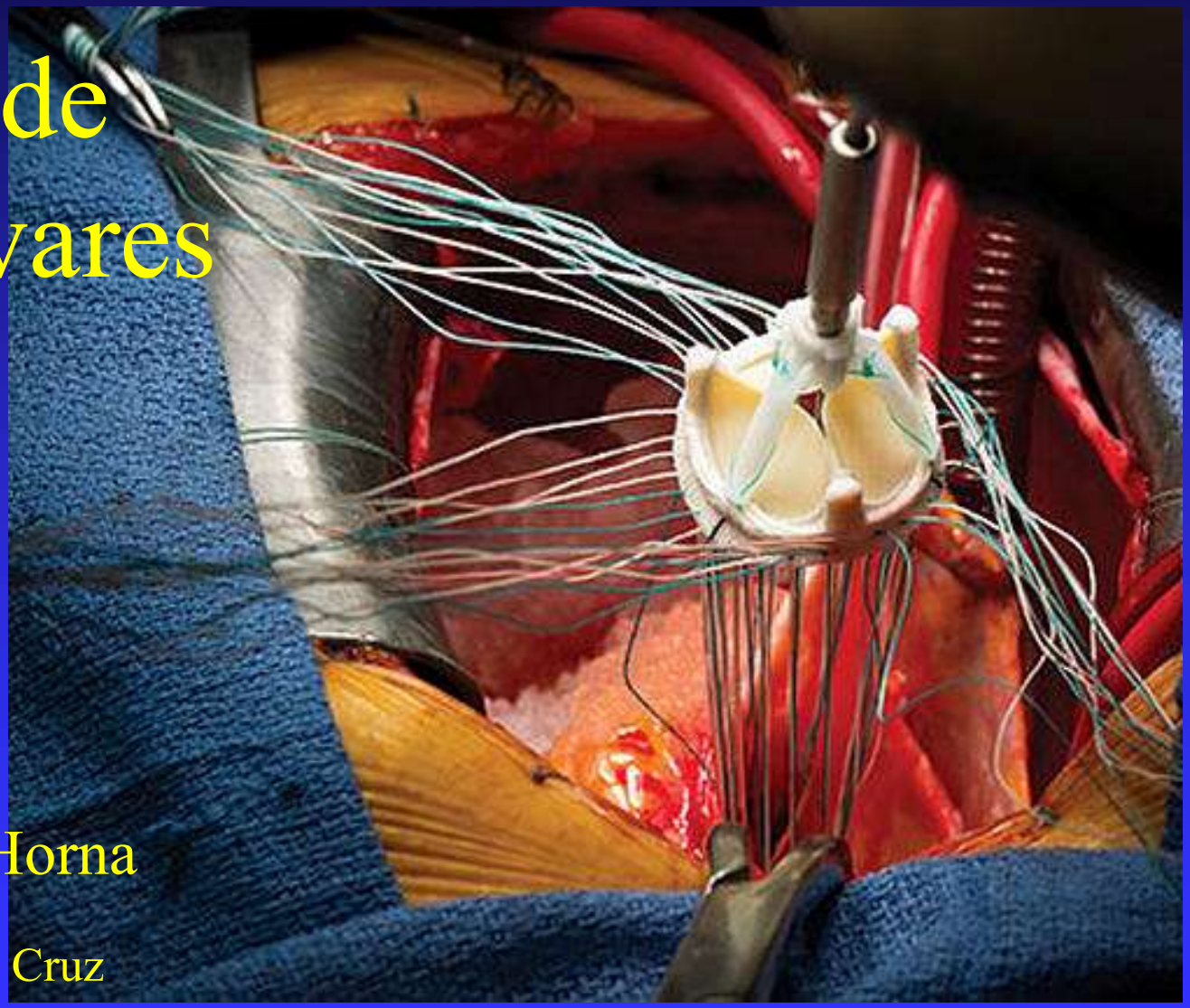
Avaliação de Próteses Valvares

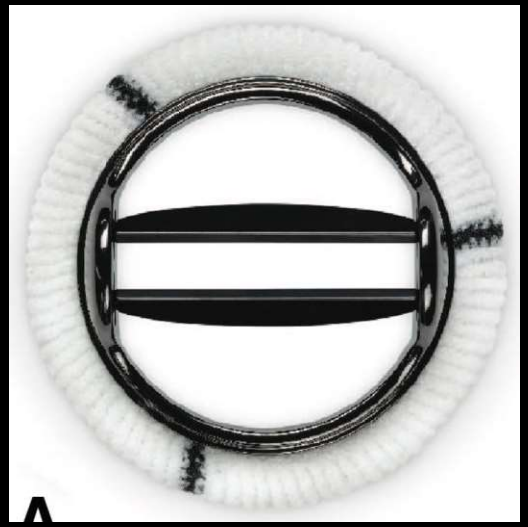


Dr. Manuel Paredes Horna
Hospital do Coração
Hospital Alemão Oswaldo Cruz
São Paulo - Brasil

Próteses Valvares: Classificação

Próteses Mecânicas

SE



Duplo Disco

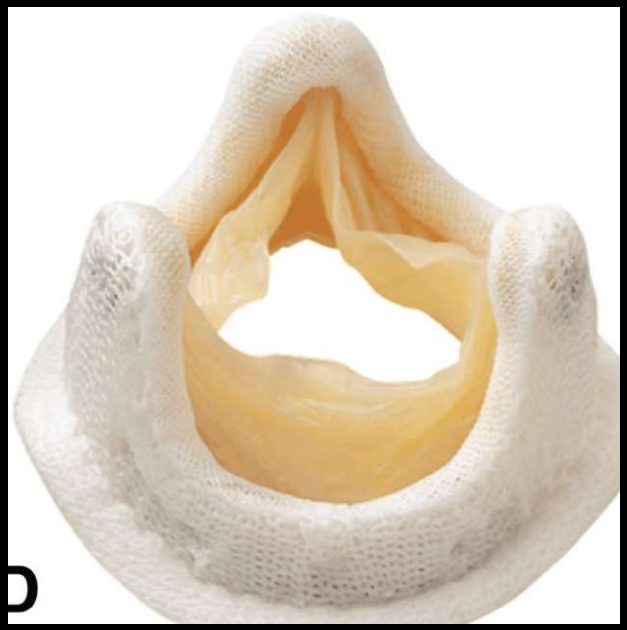
Mono Disco

Circulation/AHA February 24, 2009;119:1034-1048

Próteses Valvares: Classificação

Próteses Biológicas

"Stented"



Porcina

Pericárdio Bovino

"Stentless"

Porcina

Circulation/AHA February 24, 2009;119:1034-1048

Endopróteses Valvares

Percutaneous Transcatheter Implantation of an Aortic Valve Prosthesis for Calcific Aortic Stenosis First Human Case Description

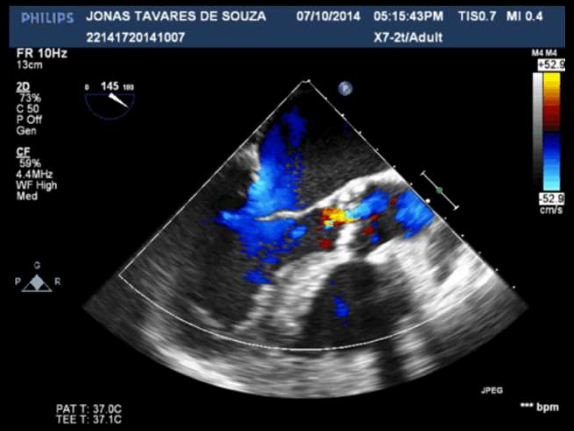
Alain Cribier, MD; Helene Eltchaninoff, MD; Assaf Bash, PhD; Nicolas Borenstein, MD; Christophe Tron, MD; Fabrice Bauer, MD; Genevieve Derumeaux, MD; Frederic Anselme, MD; François Laborde, MD; Martin B. Leon, MD

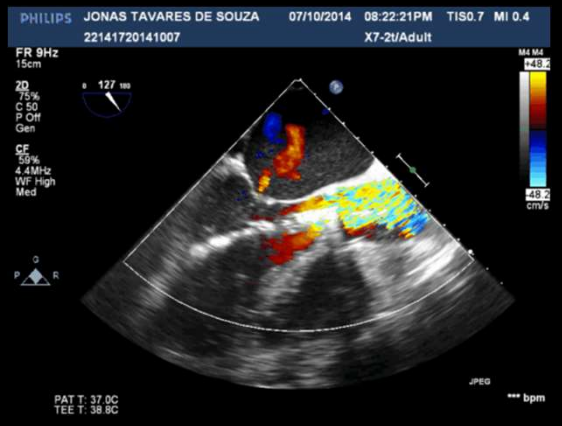
Background—The design of a percutaneous implantable prosthetic heart valve has become an important area for investigation. A percutaneously implanted heart valve (PHV) composed of 3 bovine pericardial leaflets mounted within a balloon-expandable stent was developed. After ex vivo testing and animal implantation studies, the first human implantation was performed in a 57-year-old man with calcific aortic stenosis, cardiogenic shock, subacute leg ischemia, and other associated noncardiac diseases. Valve replacement had been declined for this patient, and balloon valvuloplasty had been performed with nonsustained results. Methods and Results—With the use of an antegrade transseptal approach, the PHV was successfully implanted within the diseased native aortic valve, with accurate and stable PHV positioning, no impairment of the coronary artery blood flow or of the mitral valve function, and a mild paravalvular aortic regurgitation. Immediately and at 48 hours after implantation, valve function was excellent, resulting in marked hemodynamic improvement. Over a follow-up period of 4 months, the valvular function remained satisfactory as assessed by sequential transesophageal echocardiography, and there was no recurrence of heart failure. However, severe noncardiac complications occurred, including a progressive worsening of the leg ischemia, leading to leg amputation with lack of healing, infection, and death 17 weeks after PHV implantation. Conclusions—Nonsurgical implantation of a prosthetic heart valve can be successfully achieved with immediate and midterm hemodynamic and clinical improvement. After further device modifications, additional durability tests, and confirmatory clinical implantations, PHV might become an important therapeutic alternative for the treatment of selected patients with nonsurgical aortic stenosis.
(Circulation. 2002;106:3006-3008.)

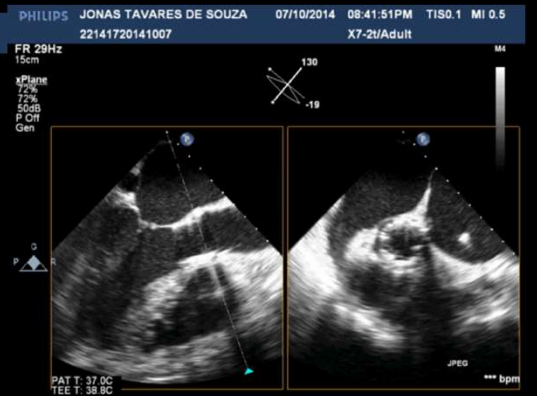
Endopróteses Valvares

Próteses Percutâneas

E. Sapiens







Endopróteses Valvares

Percutaneous Implantation of the CoreValve Self-Expanding Valve Prosthesis in High-Risk Patients With Aortic Valve Disease
The Siegburg First-in-Man Study

Eberhard Grube, MD; Jean C. Laborde, MD; Ulrich Gerckens, MD; Thomas Felderhoff, MD; Barthel Sauren, MD; Lutz Buellesfeld, MD; Ralf Mueller, MD; Maurizio Menichelli, MD; Thomas Schmidt, MD; Bernfried Zickmann, MD; Stein Iversen, MD; Gregg W. Stone, MD

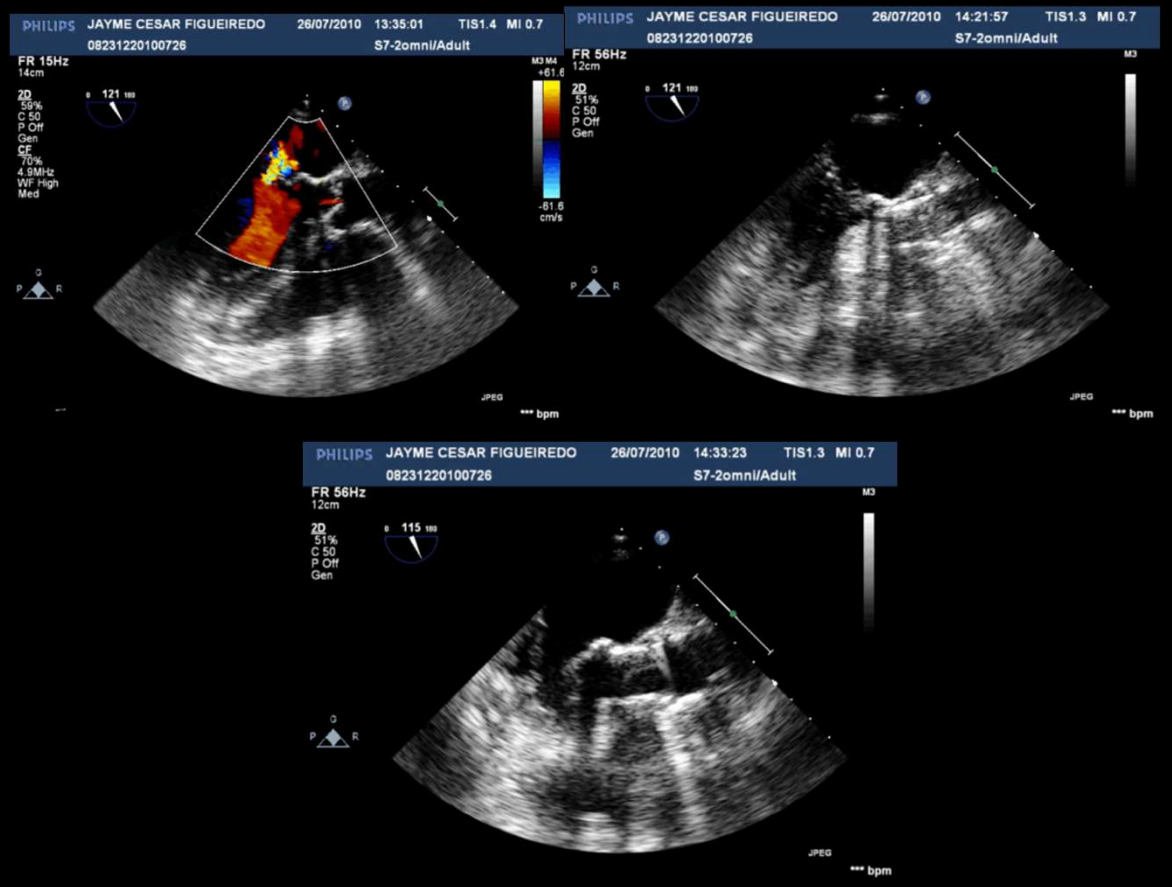
Methods and Results—Symptomatic high-risk patients with an aortic valve area 1 cm2 were considered for enrollment. CoreValve implantation was performed under general anesthesia with extracorporeal support using the retrograde approach. Clinical follow-up and transthoracic echocardiography were performed after the procedure and at days 15 and 30 after device implantation to evaluate short-term patient and device outcomes. A total of 25 patients with symptomatic aortic valve stenosis (mean gradient before implantation, 44.210.8 mm Hg) and multiple comorbidities (median logistic EuroScore, 11.0%) were enrolled. Device success and procedural success were achieved in 22 (88%) and 21 (84%) patients, respectively. Successful device implantation …

Conclusions—Percutaneous implantation of the self-expanding CoreValve aortic valve prosthesis in high-risk patients with aortic stenosis with or without aortic regurgitation is feasible and, when successful, results in marked hemodynamic and clinical improvement. ***(Circulation. 2006;114:1616-1624.)***

Endopróteses Valvares

Próteses Percutâneas

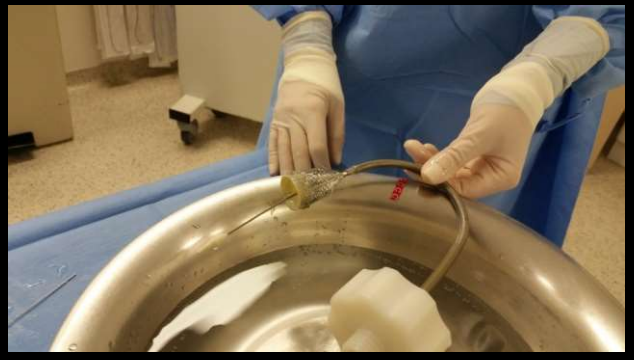
Core Valve

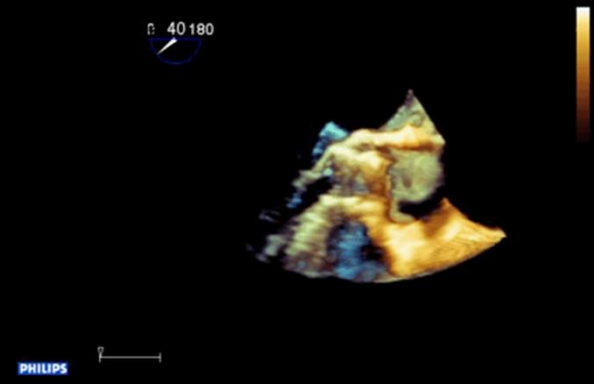


Endopróteses Valvares

Próteses Percutâneas

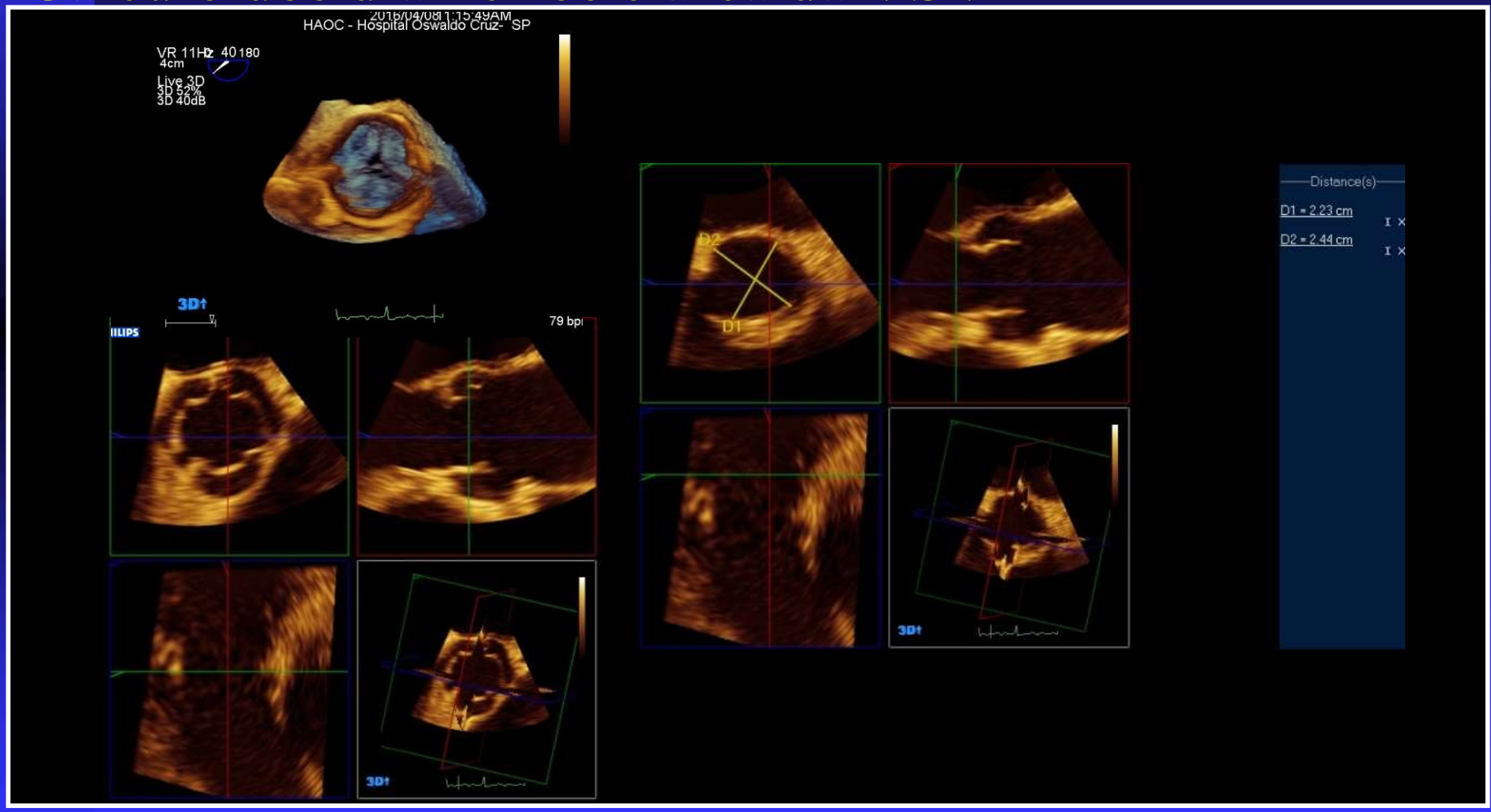
Lotus





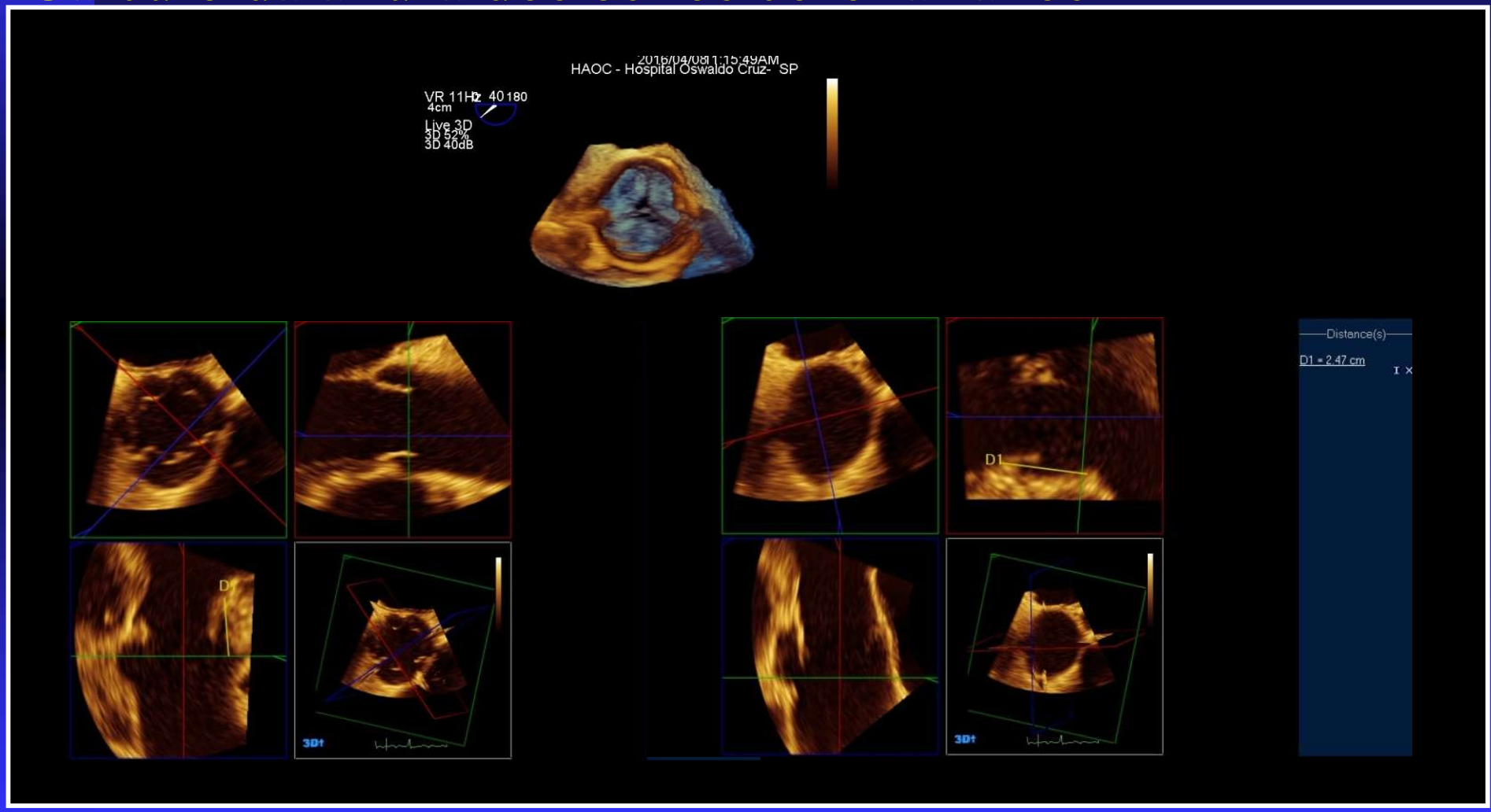
Próteses Valvares: medidas TAVI – 3D TE

Cálculo dos diâmetros e área da VSVE

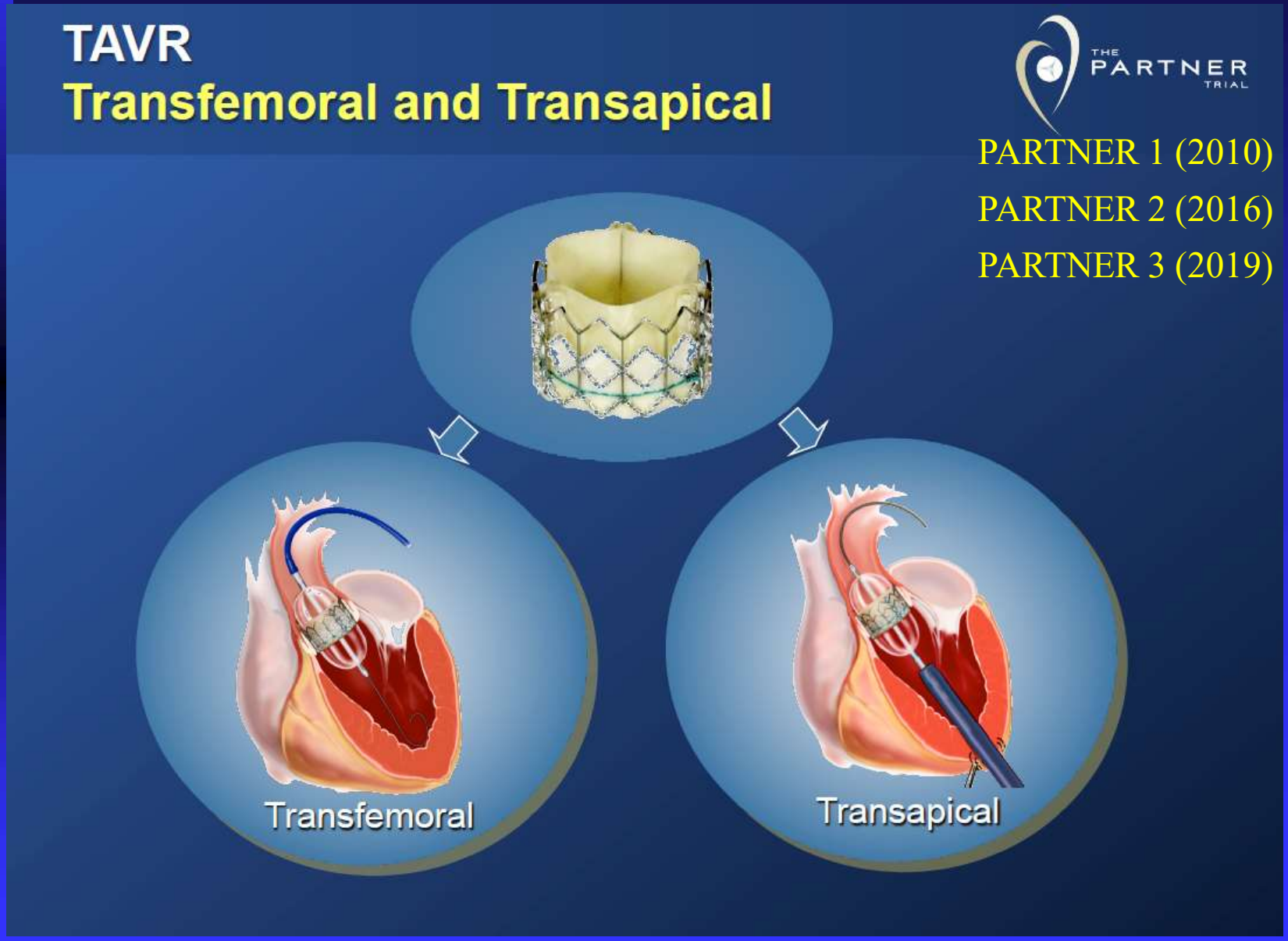


Próteses Valvares: medidas TAVI – 3D TE

Cálculo da altura dos ostios coronarianos



Endopróteses Valvares: TAVI vs Cirurgia



PARTNER 1 (2010)

PARTNER 2 (2016)

PARTNER 3 (2019)

Endopróteses Valvares: TAVI vs Cirurgia

PARTNER 1 (2010)

PARTNER 2 (2016)

PARTNER 3 (2019)

5 yr outcome Intermediate Risk AS SAVR vs TAVR

The NEW ENGLAND JOURNAL of MEDICINE

ESTABLISHED IN 1812 FEBRUARY 27, 2020 VOL. 382 NO. 9

Five-Year Outcomes of Transcatheter or Surgical Aortic-Valve Replacement

R.R. Makkar, V.H. Thourani, M.J. Mack, S.K. Kodali, S. Kapadia, J.G. Webb, S.-H. Yoon, A. Trento, L.G. Svensson, H.C. Herrmann, W.Y. Szeto, D.C. Miller, L. Satler, D.J. Cohen, T.M. Dewey, V. Babaliaros, M.R. Williams, D.J. Kereiakes, A. Zajarias, K.L. Greason, B.K. Whisenant, R.W. Hodson, D.L. Brown, W.F. Fearon, M.J. Russo, P. Pibarot, R.T. Hahn, W.A. Jaber, E. Rogers, K. Xu, J. Wheeler, M.C. Alu, C.R. Smith, and M.B. Leon, for the PARTNER 2 Investigators*

MASSACHUSETTS GENERAL HOSPITAL HEART CENTER

Judy Hung
USA

Endopróteses Valvares: TAVI vs Cirurgia

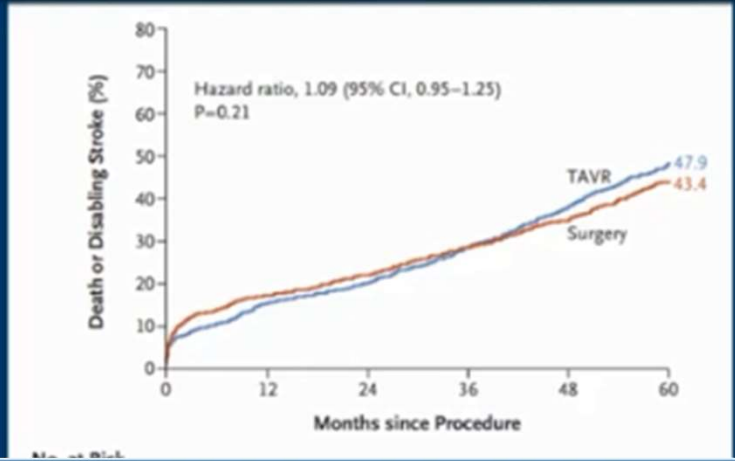
PARTNER 1 (2010)

PARTNER 2 (2016)

PARTNER 3 (2019)

5 yr outcome Intermediate Risk AS SAVR vs TAVR

No difference in death or disabling stroke



5 yr outcome Intermediate Risk AS SAVR vs TAVR

TAVR increased paravalvular leak, rehospitalizations and reintervention

those assigned to surgical aortic-valve replacement. Values for incidence were calculated with the use of Kaplan–Meier methods and were compared with the use of the log-rank test. The number of patients at risk at 60 months includes patients with early visits ahead of the follow-up window.

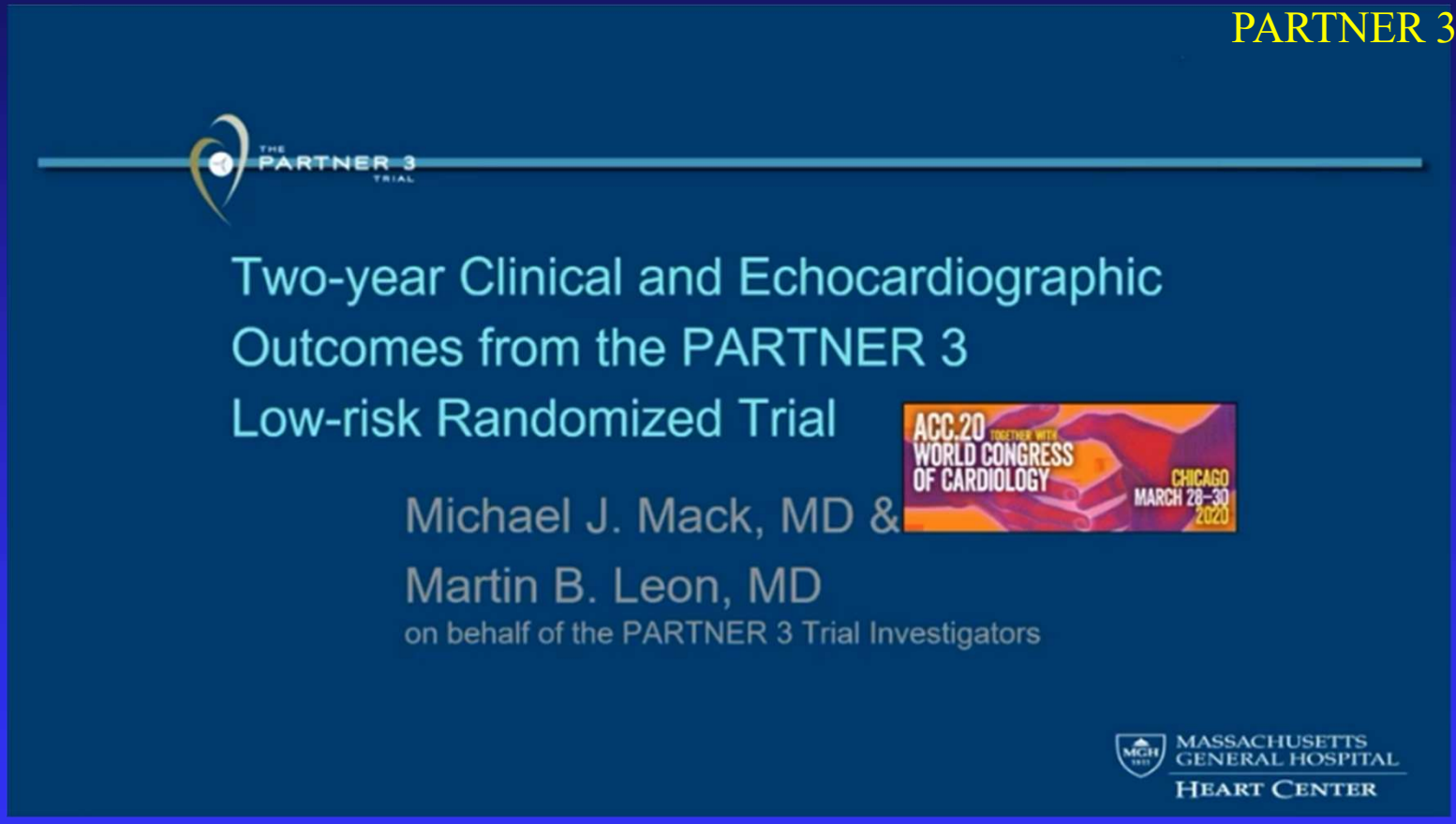
MASSACHUSETTS GENERAL HOSPITAL
HEART CENTER

Endopróteses Valvares: TAVI vs Cirurgia

PARTNER 1 (2010)

PARTNER 2 (2016)

PARTNER 3 (2019)

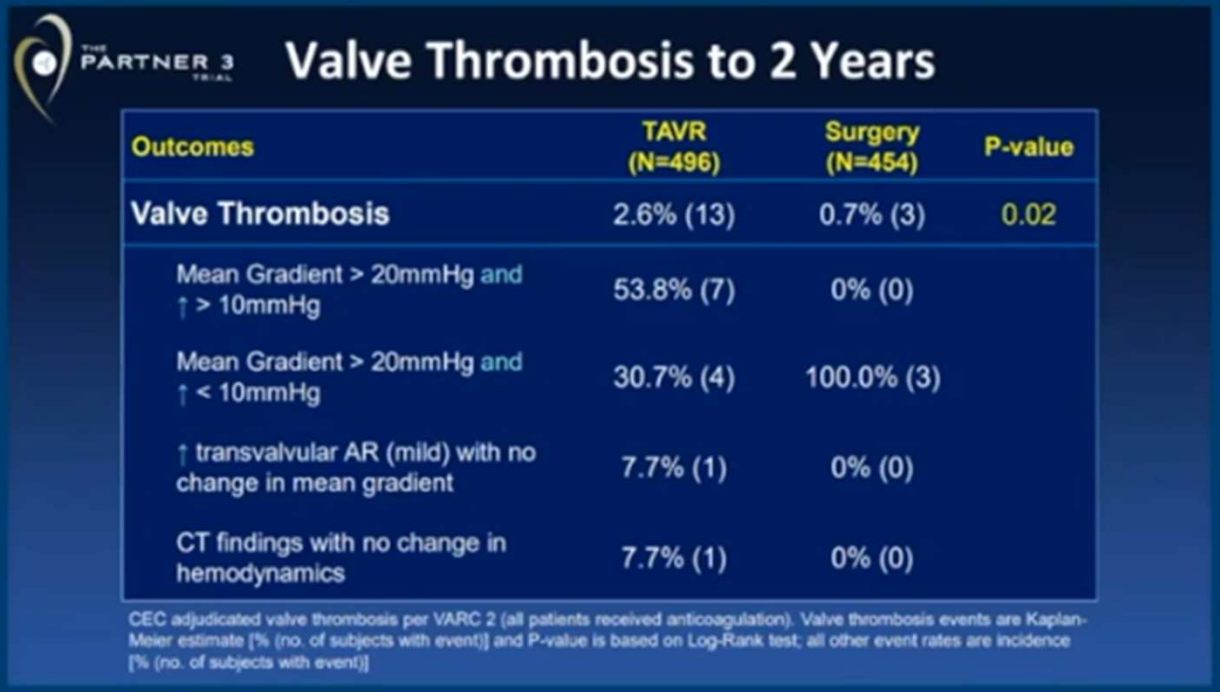


Endopróteses Valvares: TAVI vs Cirurgia

PARTNER 1 (2010)

PARTNER 2 (2016)

PARTNER 3 (2019)



MASSACHUSETTS GENERAL HOSPITAL
HEART CENTER

Próteses Valvares: Interpretação de Gradientes Elevados

Definição

- Gradiente médio > 15 a 20 mmHg (aórtica)
- Gradiente médio > 5 a 7 mmHg (mitral)

Causas

- Estado hiperdinâmico (hiperadrenergismo, insuficiência valvar)
- Desproporção Prótese – Paciente
- Obstrução Patológica

Estratégia

- Cálculo Índice Velocidade Doppler (Vel. VSVE / Vel. prótese)
- Cálculo Área Orifício Efetivo (cm^2/m^2) paciente
- Tipo e número de prótese (Área Orifício Efetivo fabricante)

Circulation/AHA February 24, 2009;119:1034-1048

Próteses Valvares: Interpretação de Gradientes Elevados

Índice Velocidade Doppler (IVD) (V_{VSVE} / $V_{prótese}$)

Se IVD normal >0,35 (aórtica) ou > 0,45 (mitral)
Estado Hiperdinâmico / Obstrução SubValvar

Se IVD diminuído < 0,35 (aórtica) ou < 0,45 (mitral)

a. Desproporção Prótese Paciente

Cálculo AOE paciente = AOE fabricante, porém:

Índice < 0,85 cm^2/m^2 (aórtica) ou < 1,2 cm^2/m^2 (mitral)

b. Obstrução Patológica

Cálculo AOE paciente < AOE fabricante
Exceto próteses mecânicas duplo disco:
-Mobilidade Folhetos ETE ou Fluoroscopia (mecânica)

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Desproporção “mismatch” prótese vs paciente:

Definição

Área Orificio Efetivo de prótese normofuncionante, porém proporcionalmente muito pequena ao tamanho corporal do paciente, resultando em gradientes anormalmente elevados

Incidência

Desproporção MODERADA: 20-70% próteses aórticas
0-70% próteses mitrais

Desproporção IMPORTANTE: 2-10% ambas próteses

Quantificação

Posição	Leve	Moderada	Importante
Aórtica	> 0,85 cm^2/m^2	<= 0,85cm^2/m^2	<= 0,65 cm^2/m^2
Mitral	> 1,2	<= 1,2	<= 0,9

Circulation/AHA February 24, 2009;119:1034-1048

Desproporção “mismatch” prótese vs paciente:

Impacto clínico

- Pouca melhora dos sintomas e da Classe Funcional
- Piora Capacidade Exercício
- Menor regressão HVE
- Pouca melhora Reserva Fluxo Coronário
- Maiores eventos cardíacos adversos
- Impacto significativo na mortalidade curto/longo prazo

Pior impacto:

- Pacientes com disfunção do VE e submetidos a TVAo
- Pacientes jovens
- TVMitral (HP persistente, > ICC, < sobrevida)

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Próteses Valvares: persistência dos sintomas

Conclusion

- Lack of symptom improvement after AVR, is common
- Multiple causes
  - Prosthesis dysfunction
    - Patient prosthesis mismatch (PPM) – mainly SAVR
    - PVL – Mainly TAVR
  - AS was not "true" severe
  - Symptoms were not associated to AS but rather comorbidities
    - Non-cardiac (frailty, COPD..)
    - Cardiac (amyloidosis, Afib, mitral regurgitation, Ischemic heart disease)
  - AS associated LV remodeling

Jordi Dahl
Denmark

Estenose Aórtica nos últimos 2 anos (2019 a 2020)

Advances in the management of aortic stenosis

Summary

- 1. Coexistence of cardiac amyloid in AS referred for TAVR
  - 13-16% incidence; outcomes better with TAVR than medical therapy
- 2. Prognostic importance of Flow rate in severe AS
- 3. Intermediate risk SAVR vs TAVR for AS:5 year outcome
  - no difference in death or disabling stroke; however TAVR had higher paravalvular leak, rehospitalization rates and reintervention rates
- 4. Low Risk SAVR vs TAVR for AS:2 year outcome; presented at ACC 2020
  - No difference in primary endpoint of death, disabling stroke or rehospitalization; TAVR: increased valve thrombosis at 2 yr

Judy Hung
USA

#EACVIBestOf2020