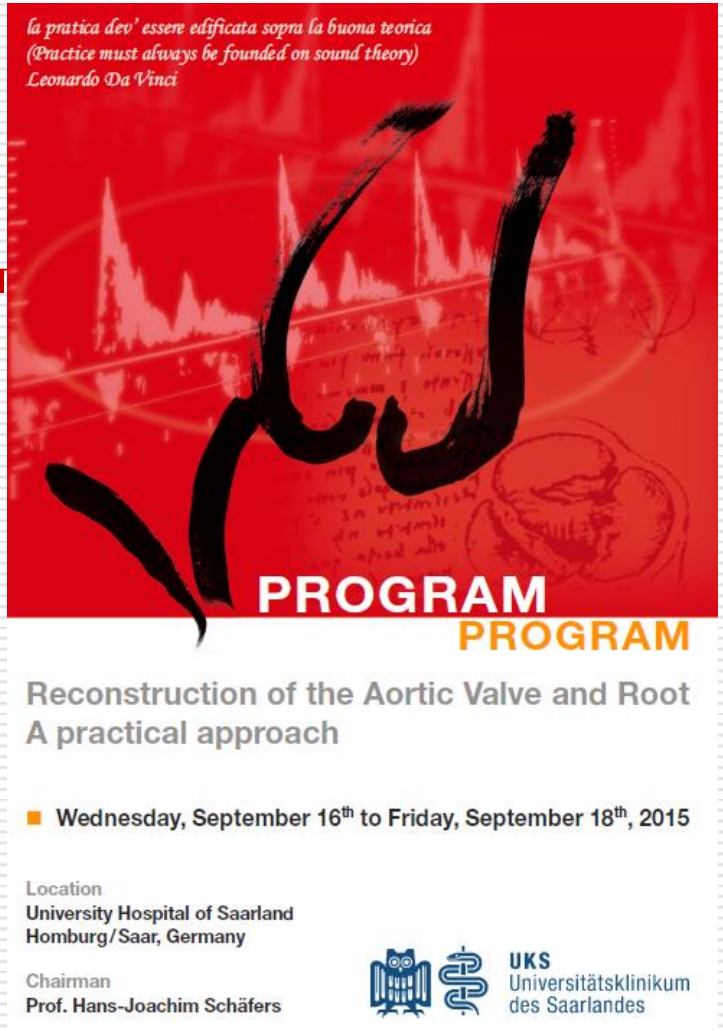
Vall d'Hebron
Hospital General Universitari
Servei de Cardiologia
Barcelona

Aortic regurgitation and aneurysm. Epidemiology and Guidelines



Arturo Evangelista

Distribution of Valvular Heart Diseases in the Euro Heart Survey

5001 patients

- **Native Valve Disease** 72%
  - AS 34%
  - AR 10%
  - MS 10%
  - MR 25%
  - Multiple 20%
  - Right 1%
- **Previous Valvular Intervention** 28%
  - Valve Repair 18%
  - Valve Replacement 82%

Iung et al. *Eur Heart J* 2003;24:1244-53

European Heart Journal 2012 - doi:10.1093/eurheartj/ehs109 & European Journal of Cardio-Thoracic Surgery 2012 - doi:10.1093/ejcts/ezs455).

www.escardio.org/guidelines

EACTS

EUROPEAN SOCIETY OF CARDIOLOGY®

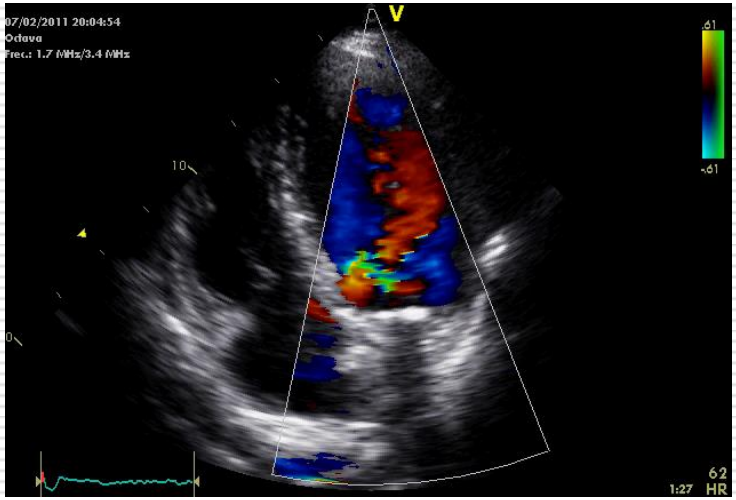
Patient Characteristics in the Euro Heart Survey

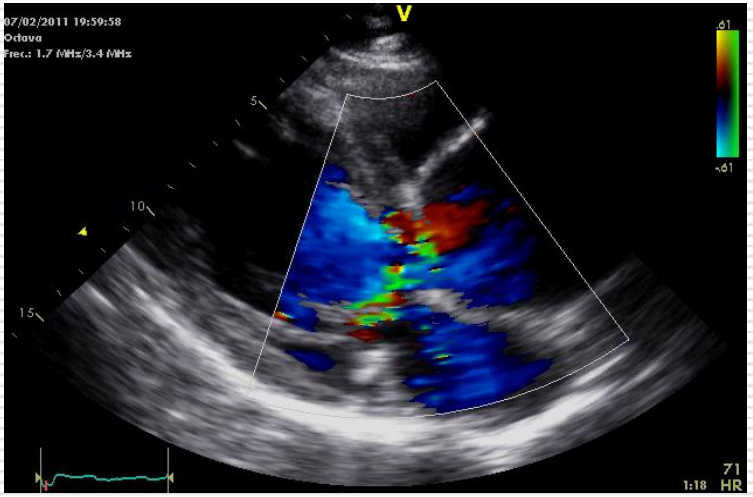
	Age (years)	≥ 70 years (%)	≥ 1 comorbidity (%)
AS	69±12	56	36
AR	58±16	25	26
MS	58±13	18	22
MR	65±14	44	42

Iung et al. *Eur Heart J* 2003;24:1244-53

Aortic regurgitation

- Prevalence: 5 out of 10,000 people
- Pure AR: 13% of all valve intervention





Aortic regurgitation - *Etiology*

Michael Kindermann

	Abnormalities of the cusps	Abnormalities of the aortic root	Abnormalities of cusps & root
Genetic	- Bicuspid valve (1-2% popul.) - Unicuspid, quadricuspid valve - Osteogenesis imperfecta - Marfan syndrome - Loeys-Dietz syndrome		- Ehlers-Danlos syndrome - Familial thoracic aortic aneurysms and dissections - Idiopathic cystic medial necrosis - Pseudoxanthoma elasticum
Inflammatory	- Rheumatic valve disease - Libman Sacks endocarditis (SLE) - Ankylosing spondylitis - Reiter´s syndrome		- Behcet´s disease - Syphilitic aortitis - Takayasu arteritis - Giant cell arteritis
Degenerative	- Primary myxomatous degeneration - Degenerative calcification		
Abnormal loading		- Hypertensive aortic root dilatation	
Destruction	- Infectious endocarditis - Traumatic tear/avulsion of aortic cusp	- Traumatic aortic dissection	
Drug side effects	- Dopamine agonists - Anorectic drugs		

Most frequent etiologies 2001
(Euro Heart Survey)

Degenerative	50%
Rheumatic	15%
Congenital	15%
Endocarditis	8%

Causes of Pure Aortic Regurgitation in Patients Having Isolated Aortic Valve Replacement at a Single US Tertiary Hospital (1993 to 2005)

William Clifford Roberts, MD; Jong Mi Ko, BA;
Timothy Richard Moore, MD; William Hampton Jones III, MD

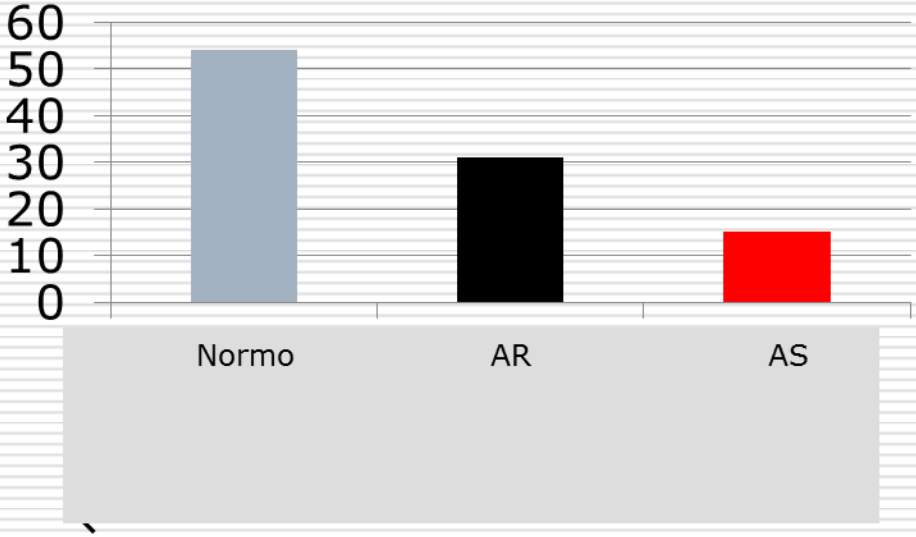
TABLE 1. Causes of AR in Patients Having Isolated AVR at Baylor University Medical Center (1993–2005)

Cause of AR	Total	Ages at Operation, Range (Mean), y	M	F	Acute	Chronic	SH	Coronary Artery Bypass Grafting
Valve (122 [46%])								
Congenital malformation without Infective endocarditis								
Bicuspid	59 (22%)	22–77 (55)	49	10	0	59	39 (66%)	18 (31%)
Quadricuspid	2 (1%)	53–79 (66)	0	2	0	2	0	1 (50%)
Tricuspid	5 (2%)	33–48 (40)	3	2	0	5	2 (40%)	0
Infective endocarditis	46 (17%)	21–82 (45)	31	15	27	19	29 (63%)	7 (15%)
Rheumatic?	8 (3%)	25–63 (47)	6	2	0	8	6 (75%)	2 (25%)
Miscellaneous	2 (1%)	24–42 (33)	1	1	0	2	2 (100%)	1 (50%)
Nonvalve (146 [54%])								
Aortic dissection	28 (10%)	25–78 (58)	20	8	21	7	22 (79%)	5* (17%)
Marfan or forme fruste	15 (6%)	21–71 (47)	9	6	0	15	10 (67%)	1† (7%)
Aortitis	12 (4%)	35–82 (66)	5	7	0	12	10 (83%)	5 (42%)
Cause unclear	91 (34%)	50–84 (66)	58	33	0	91	83 (91%)	46 (51%)
Total	268 (100%)	21–84 (57)	182 (68%)	86 (32%)	48 (18%)	220 (82%)	203 (76%)	86 (32%)

Results of the Spanish network on Bicuspid Aortic Valve

726 patients

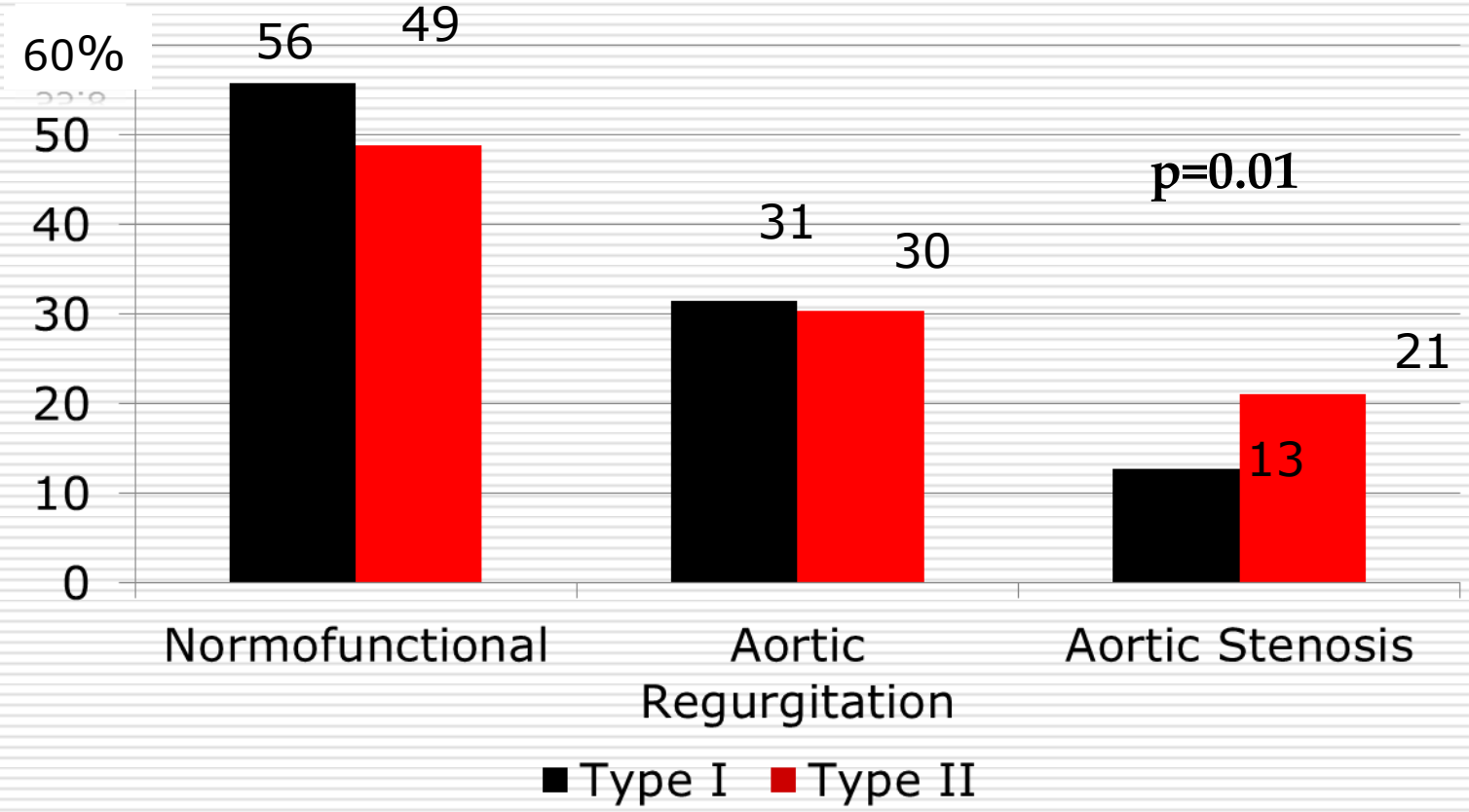
BAV
Valvular Dysfunction



n: 726 patients (850 including CoAo)
Age: 46.7±16.7 (16-84 y)
Men: 71.6 %

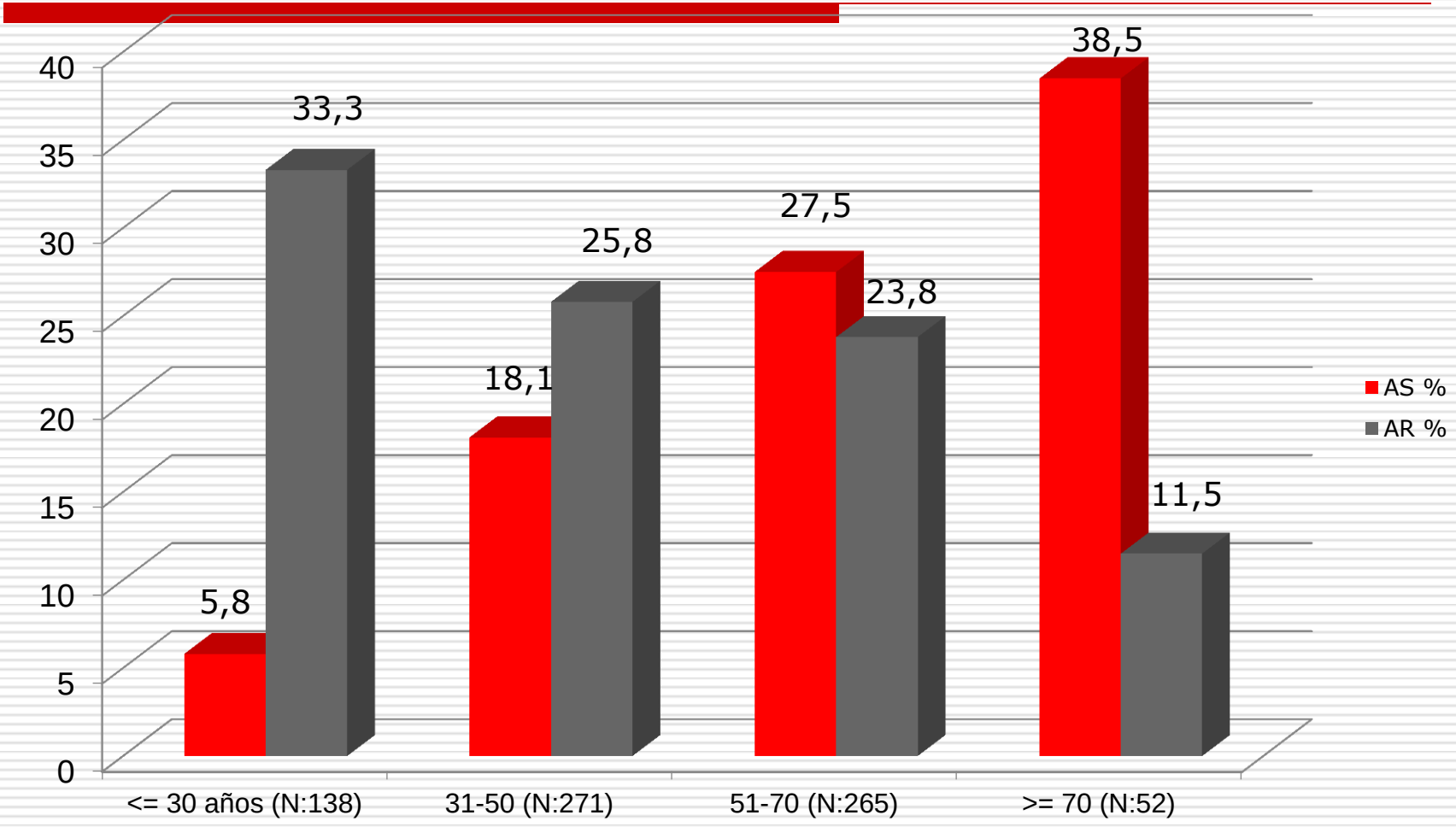
Valvular prolapse	14	%
Valvular sclerosis	66	%

BAV Phenotype and Valvular Dysfunction

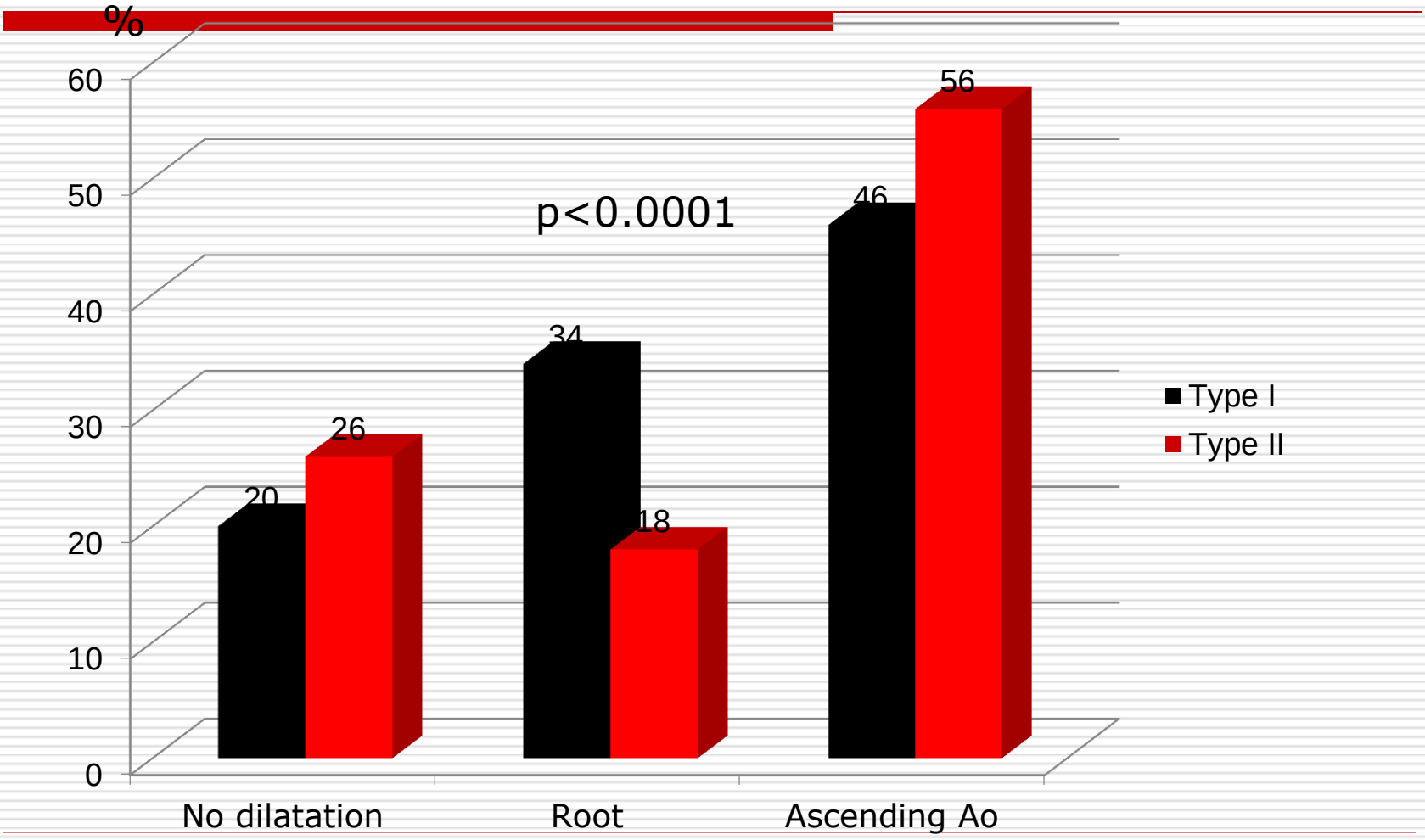


Vall d'Hebron Hospital

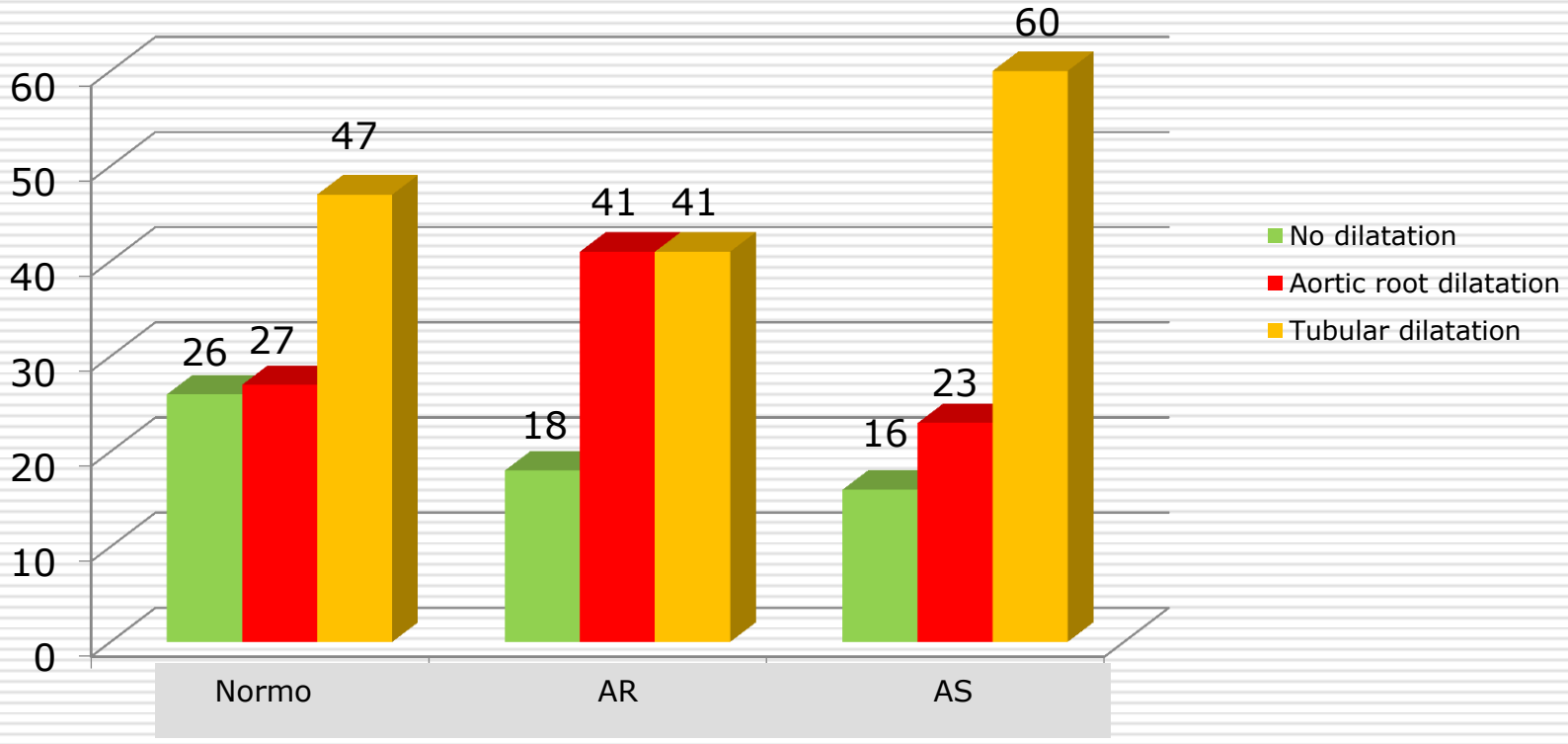
Age and Valvular Dysfunction in BAV



BAV Phenotype and Ascending Aorta Dilation



BAV Dysfunction and Ascending Aorta Dilation



Epidemiology of Ascending Aorta Aneurysm

Definition: 50% over the normal diameters

TABLE 4. Calculated Cutoff Values for Thoracic Aortic Aneurysm (TAA) Based on Normal Aortic Diameters

	TAA Ascendens (mm)		TAA Descendens (mm)	
Author	Women	Men	Women	Men
Hager et al[25]	43	48	35	38
Garcier et al[26]	40	47	30	36
Wanhainen et al[18]	42	47	33	37

Incidence: 3.6- per 100.000 /y

Thoracic Aortic Aneurysms

Incidences:

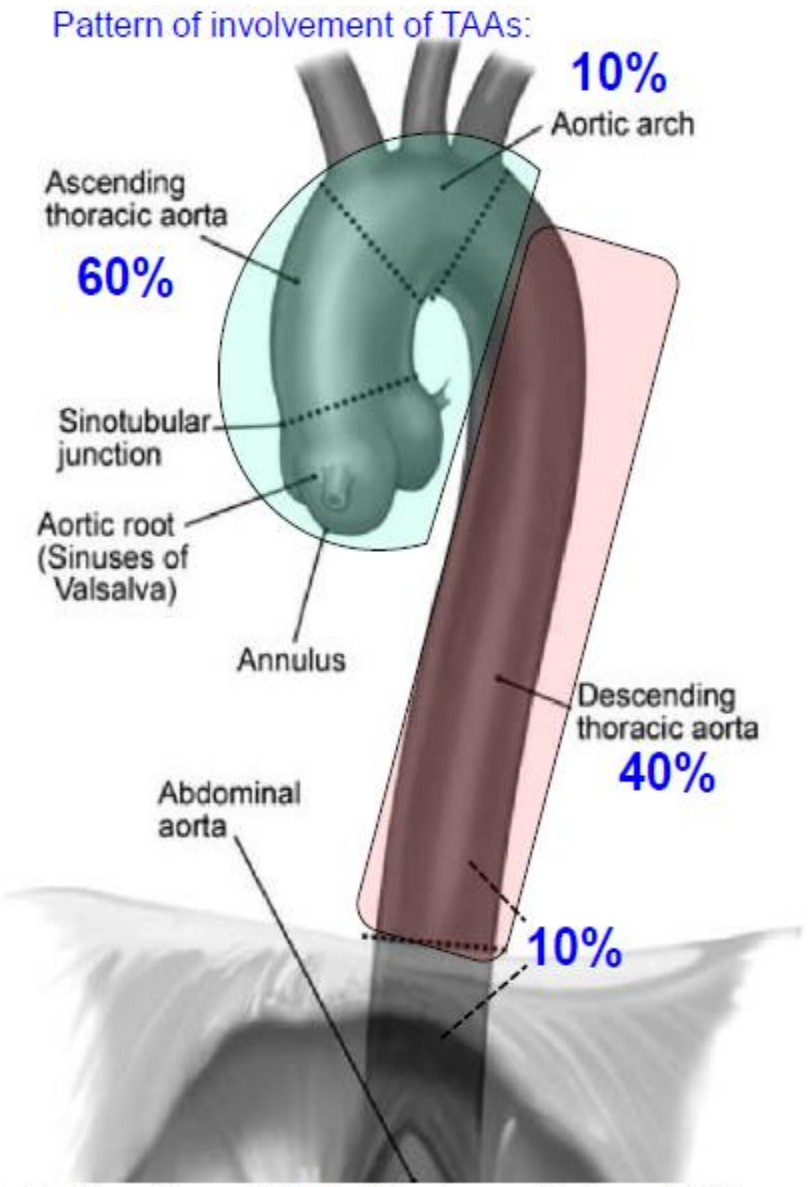
- TAA: 10 per 100.000 per year (m:f ~ 1.7:1)
- TAD: 3 per 100.000 per year (m:f ~ 4:1 to 1:1)

Causes:

- Congenital connectice tissue disorders:
  - Syndromes (Marfan, Loeys-Dietz, Ehlers-Danlos, Turner)
  - Familial thoracic aortic aneurysms
- Bicuspid aortic valve
- Aortitis:
  - Noninfective: Takasu´s arteritis, giant cell arteritis
  - Infective: Syphylitic aortitis, mycotic aneurysm
- Hypertension
- Atherosclerosis

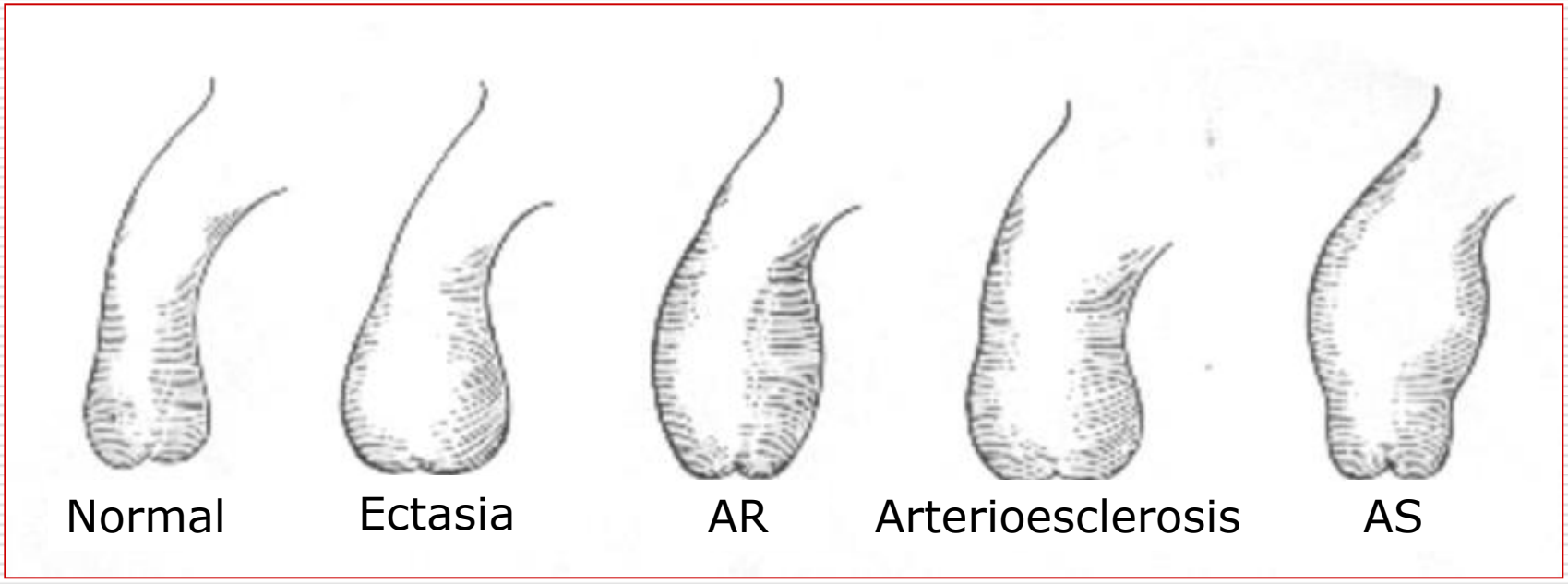
Annual risk of rupture or dissection:

- TAA < 5 cm → 2%
- TAA 5.0-5.9 cm → 3%
- TAA ≥ 6.0 cm → 7%



Isselbacher EM in Baliga, Nienaber, Isselbacher, Eagle (eds): *Aortic Dissection and Related Syndromes, Springer 2007.*

Ascending Aorta Dilation Morphology

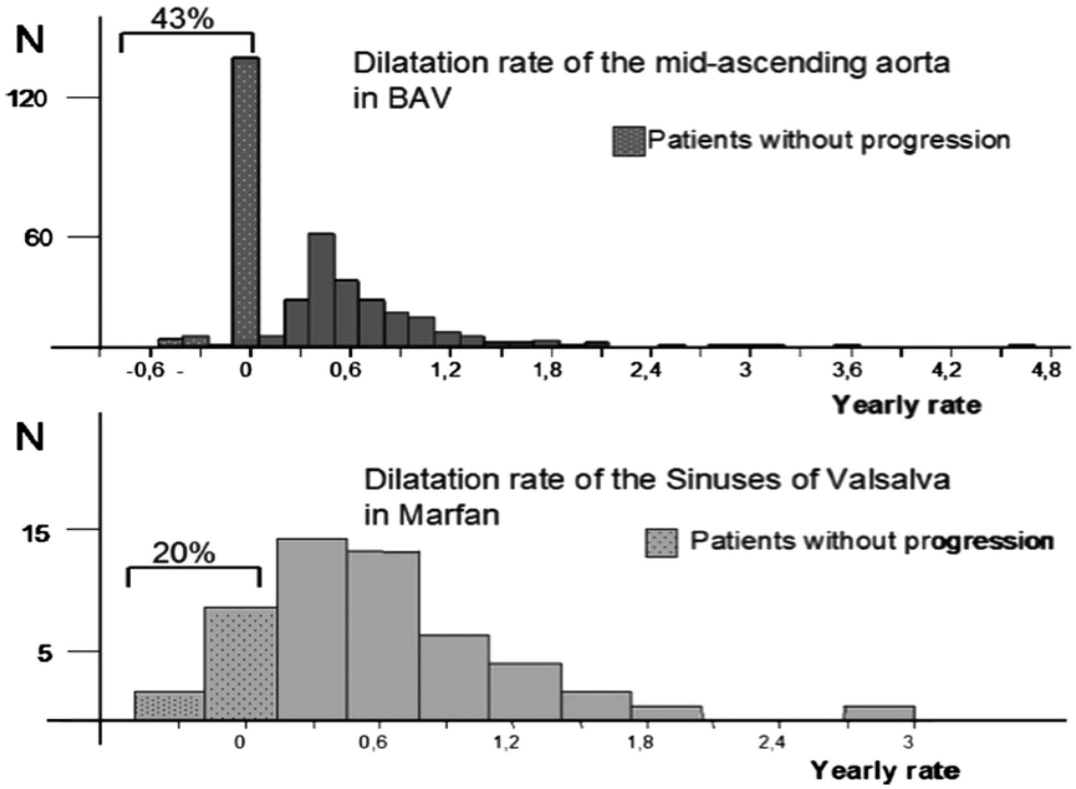


ORIGINAL ARTICLE

Aortic dilatation patterns and rates in adults with bicuspid aortic valves: a comparative study with Marfan syndrome and degenerative aortopathy

Delphine Detaint,[1,2] Hector I Michelena,[3] Vuyisile T Nkomo,[3] Alec Vahanian,[1,4] Guillaume Jondeau,[1,2,4] Maurice Enriquez Sarano[3]

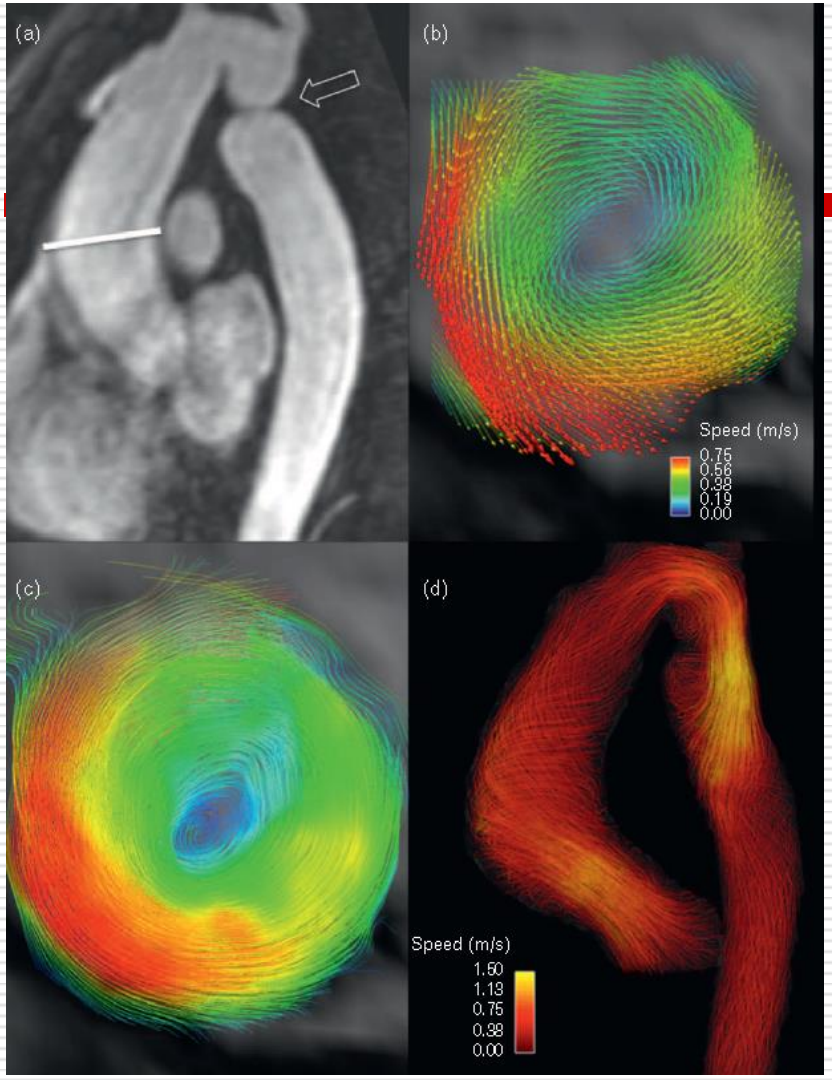
Figure 3 Comparative distribution of the aortic dilatation rate in the segment of the aorta more prone to dilatation. Tubular ascending aorta for patients with bicuspid aortic valve (BAV) and sinuses of Valsalva in patients with Marfan syndrome. Although the mean value is similar (0.42 and 0.49 mm/year respectively), the distribution of the population is very different.

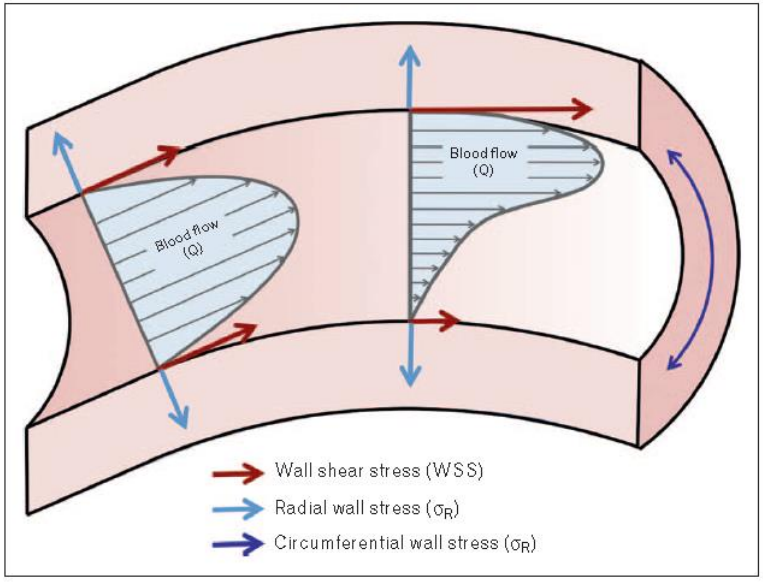


FU: 3.6y±1.2y

BAV:	353	(0.42mm/y)
Marfan S:	50	(0.49mm/y)
Degenerative:	51	(0.20mm/y)

BAV and ASYMMETRIC WSS





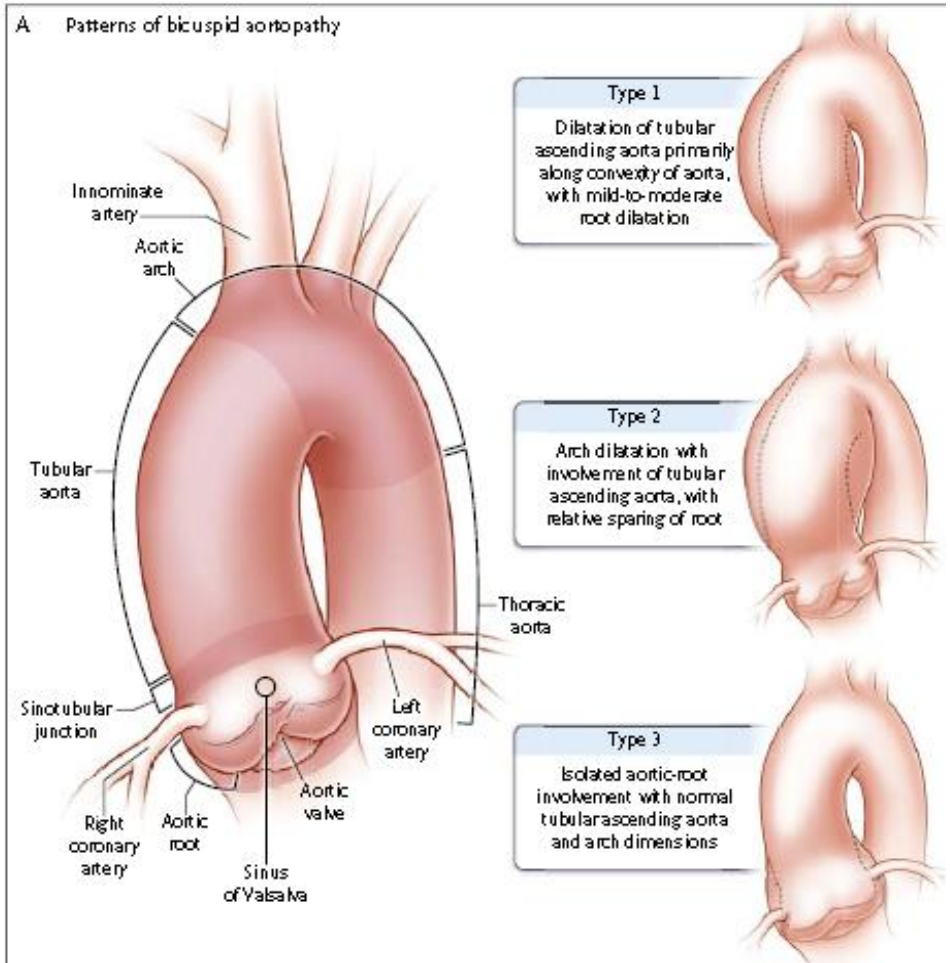
The NEW ENGLAND JOURNAL of MEDICINE

REVIEW ARTICLE

Edward W. Campion, M.D., Editor

Aortic Dilatation in Patients with Bicuspid Aortic Valve

Subodh Verma, M.D., Ph.D., and Samuel C. Siu, M.D.



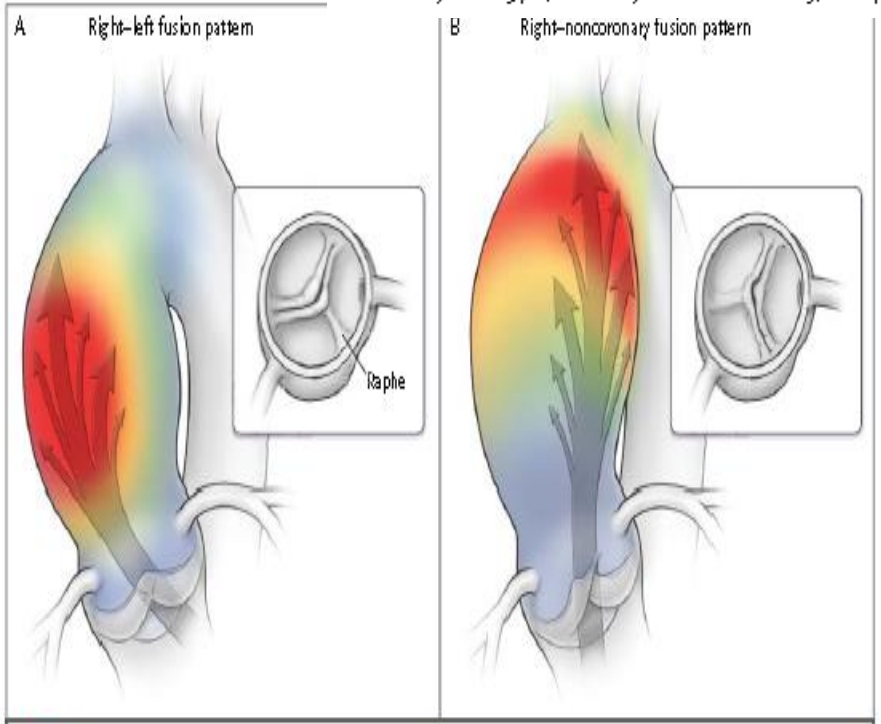


Figure 3. Morphologic Features of the Bicuspid Aortic Valve That Influence the Pattern of Aortopathy.

The fusion configuration of the aortic-valve cusps lays the foundation for changes in aortic wall shear stress and the resultant flow pattern. In the right–left fusion pattern (Panel A), the jet is directed toward the right anterior wall of the ascending aorta, where it travels in a right-handed helical direction to promote dilatation predominantly of the ascending aorta. In the pattern with fusion of the right and noncoronary cusps (Panel B), the jet is directed toward the posterior wall of the aorta, whereby the pattern of wall shear stress it causes may promote aortic dilatation within the proximal arch. Further details regarding the influence of morphologic features of bicuspid aortic valve on patterns of aortopathy are provided in Figure S1 in the Supplementary Appendix.

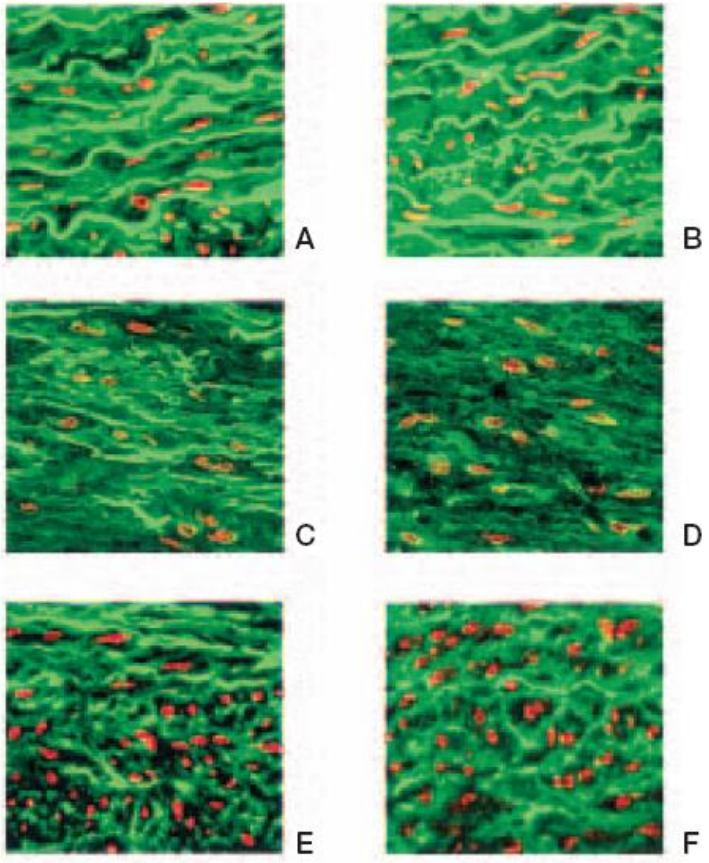
Spatial Patterns of Matrix Protein Expression in Dilated Ascending Aorta with Aortic Regurgitation: Congenital Bicuspid Valve versus Marfan's Syndrome

Alessandro Della Corte[1], Luca S. De Santo[1], Stefania Montagnani[2], Cesare Quarto[1], Gianpaolo Romano[1], Cristiano Amarelli[1], Michelangelo Scardone[1], Marisa De Feo[1], Maurizio Cotrufo[1], Giuseppe Caianiello[1]

[1]*Department of Cardiothoracic and Respiratory Sciences, Second University of Naples, V. Monaldi Hospital, Naples,*
[2]*Department of Biomorphological and Functional Sciences, Federico II University, Secondo Policlinico, Naples, Italy*

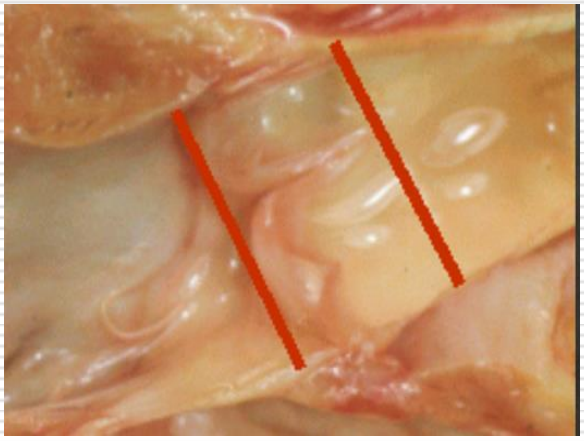
Expression of extracellular matrix proteins in BAV and Marfan aortic aneurysms is similar, but differences are remarkable in terms of type, extent and spatial distribution

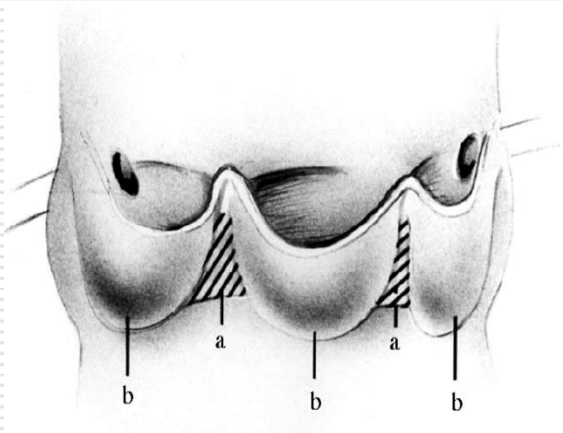
- asymmetrical in BAV
- symmetrical in Marfan



J Heart Valve Dis 2006;15:20-7

Aortic Root: Structure, Function and Surgery

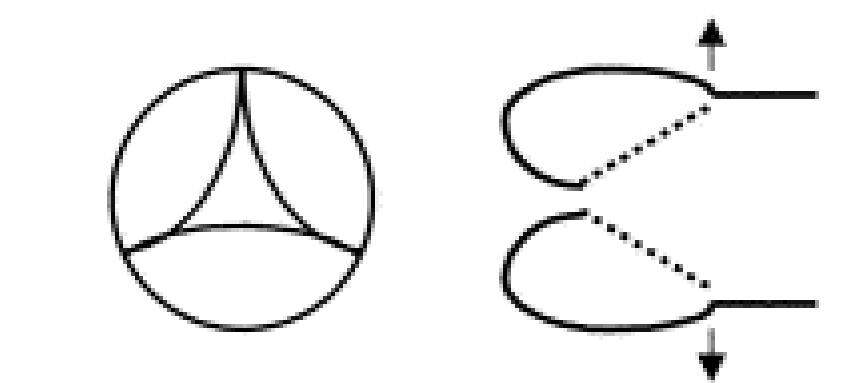


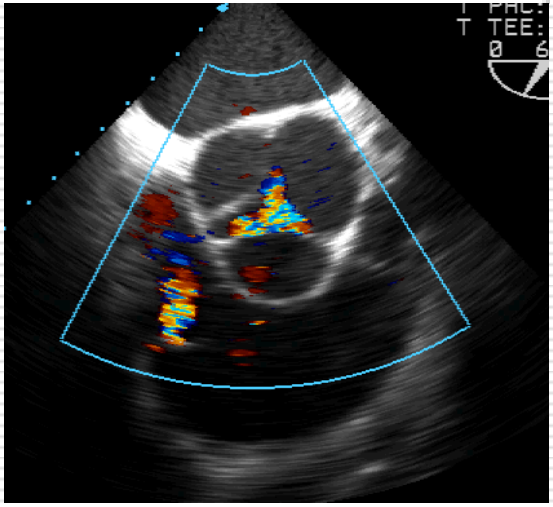


- The mechanisms by which the aortic valve opens and closes involves the whole aortic root complex:
  - Interleaflet tissues
  - Commissures
  - Annulus
  - Sinuses of Valsalva
  - Ascending aorta
- Despite normal valve leaflets, AR is present when the rest of the aortic complex is abnormal.

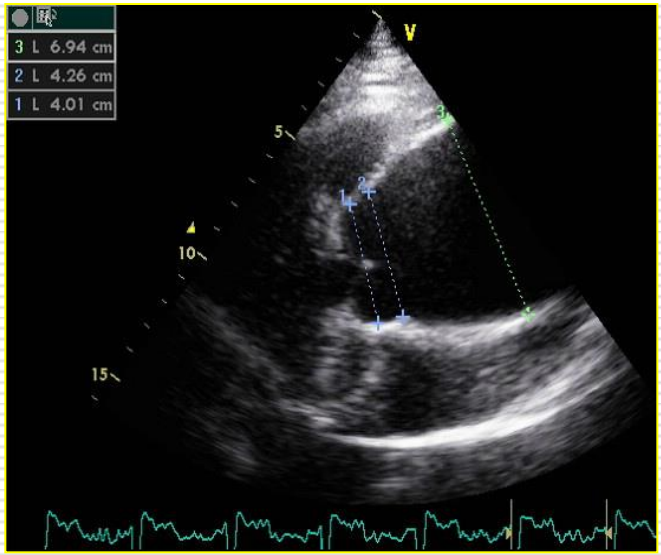
Underwood et al. Heart 2000; 83:376-80

Sinotubular Junction





STU / AoAn > 1.2



Movsowitz et al. J AmColl Cardiol 1999;33 (SuppA)

European Heart Journal (2012) **33**, 2451–2496
doi:10.1093/eurheartj/ehs109

ESC/EACTS GUIDELINES

Guidelines on the management of valvular heart disease (version 2012)

The Joint Task Force on the Management of Valvular Heart Disease of the European Society of Cardiology (ESC) and the European Association for Cardio-Thoracic Surgery (EACTS)

B. Indications for surgery in aortic root disease (whatever the severity of AR)		
Surgery is indicated in patients who have aortic root disease with maximal ascending aortic diameter[e] ≥50 mm for patients with Marfan syndrome.	I	C
Surgery should be considered in patients who have aortic root disease with maximal ascending aortic diameter: ≥45 mm for patients with Marfan syndrome with risk factors[f] ≥50 mm for patients with bicuspid valve with risk factors[g] ≥55 mm for other patients	IIa	C

[f]Family history of aortic dissection and/or aortic size increase >2 mm/year (on repeated measurements using the same imaging technique, measured at the same aorta level with side-by-side comparison and confirmed by another technique), severe AR or mitral regurgitation, desire of pregnancy.

[g]Coarctation of the aorta, systemic hypertension, family history of dissection or increase in aortic diameter >2 mm/year (on repeated measurements using the same imaging technique, measured at the same aorta level with side-by-side comparison and confirmed by another technique).

ACCF/AHA Guideline

2010 ACCF/AHA/AATS/ACR/ASA/SCA/SCAI/SIR/STS/SVM Guidelines for the Diagnosis and Management of Patients With Thoracic Aortic Disease

A Report of the American College of Cardiology Foundation/American Heart Association Task Force on Practice Guidelines, American Association for Thoracic Surgery, American College of Radiology, American Stroke Association, Society of Cardiovascular Anesthesiologists, Society for Cardiovascular Angiography and Interventions, Society of Interventional Radiology, Society of Thoracic Surgeons, and Society for Vascular Medicine

4. Imaging Modalities

4.1. Recommendations for Aortic Imaging Techniques to Determine the Presence and Progression of Thoracic Aortic Disease

Class I

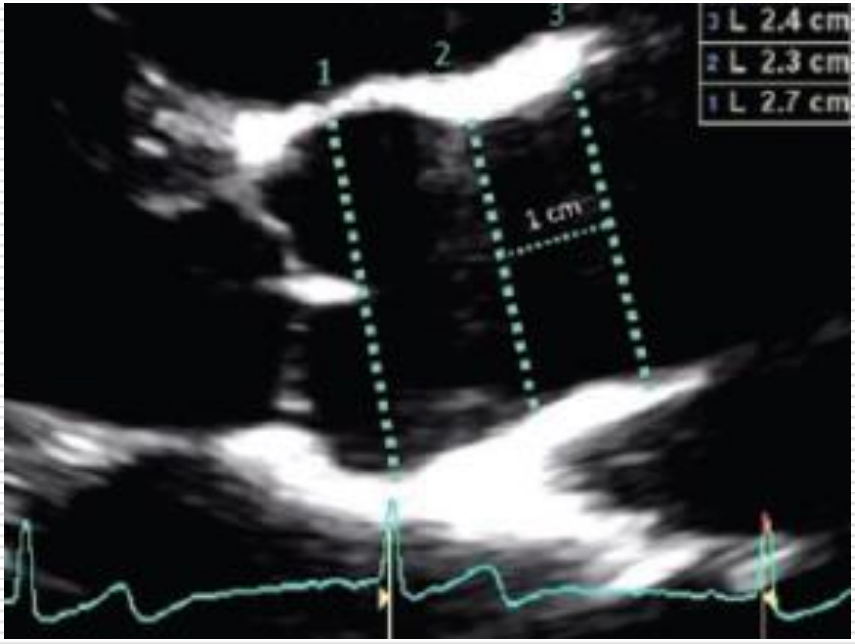
1. Measurements of aortic diameter should be taken at reproducible anatomic landmarks, perpendicular to the axis of blood flow, and reported in a clear and consistent format (see Table 5). (*Level of Evidence: C*)
2. For measurements taken by computed tomographic imaging or magnetic resonance imaging, the external diameter should be measured perpendicular to the axis of blood flow. For aortic root measurements, the widest diameter, typically at the mid-sinus level, should be used. (*Level of Evidence: C*)
3. For measurements taken by echocardiography, the internal diameter should be measured perpendicular to the axis of blood flow. For aortic root measurements, the widest diameter, typically at the mid-sinus level, should be used. (*Level of Evidence: C*)

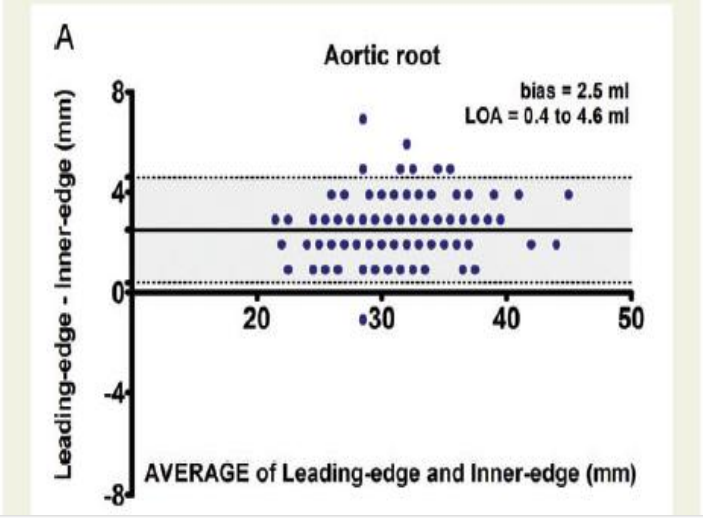
Multimodality Imaging of Diseases of the Thoracic Aorta in Adults: From the American Society of Echocardiography and the European Association of Cardiovascular Imaging

Endorsed by the Society of Cardiovascular Computed Tomography and Society for Cardiovascular Magnetic Resonance

Steven A. Goldstein, MD, Co-Chair, Arturo Evangelista, MD, FESC, Co-Chair, Suhny Abbara, MD,

(J Am Soc Echocardiogr 2015;28:119-82.)

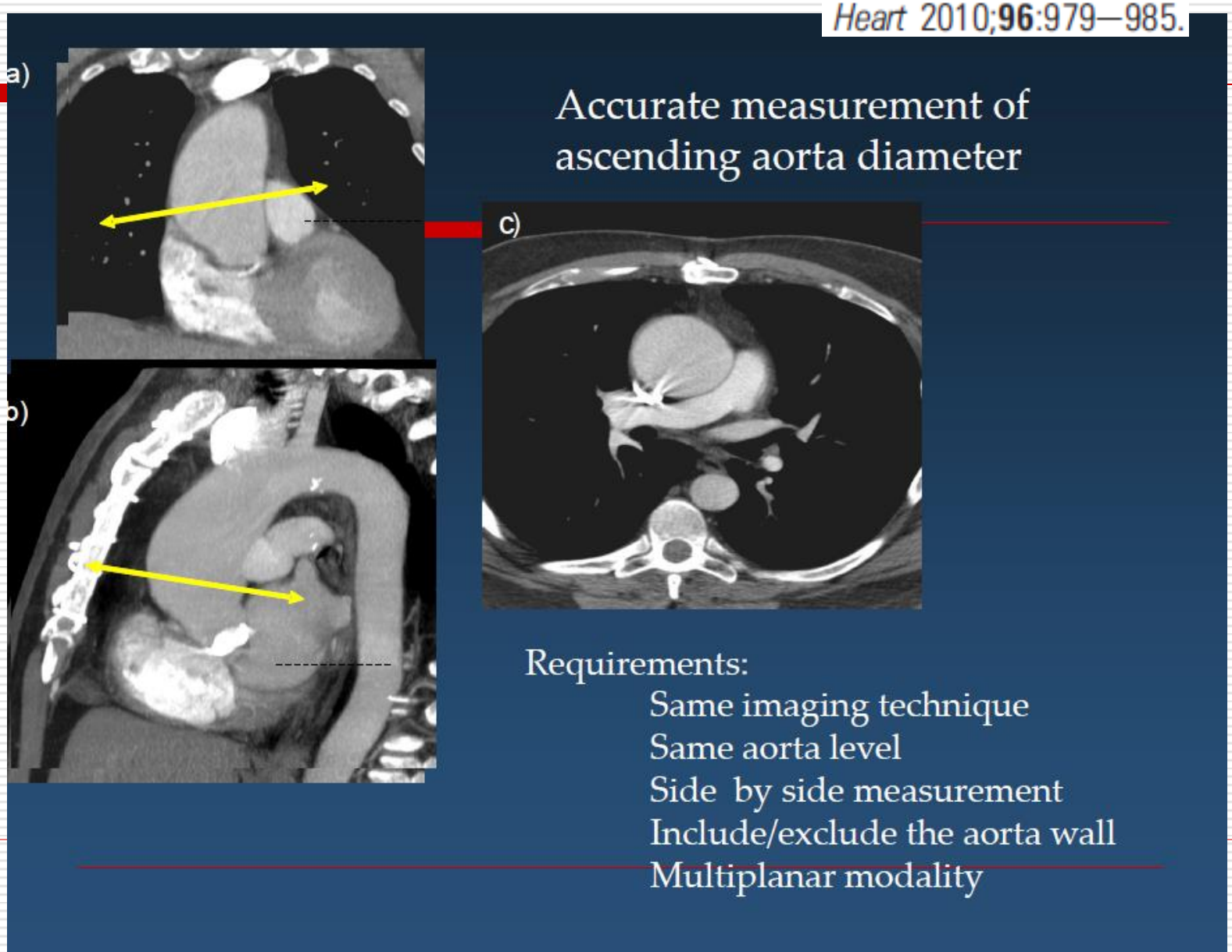




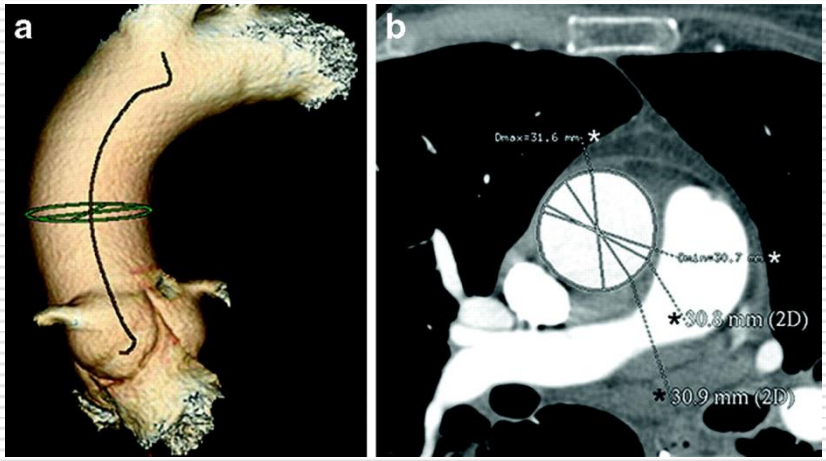
Aneurysm of the ascending aorta

Artur Evangelista

Heart 2010;**96**:979–985.



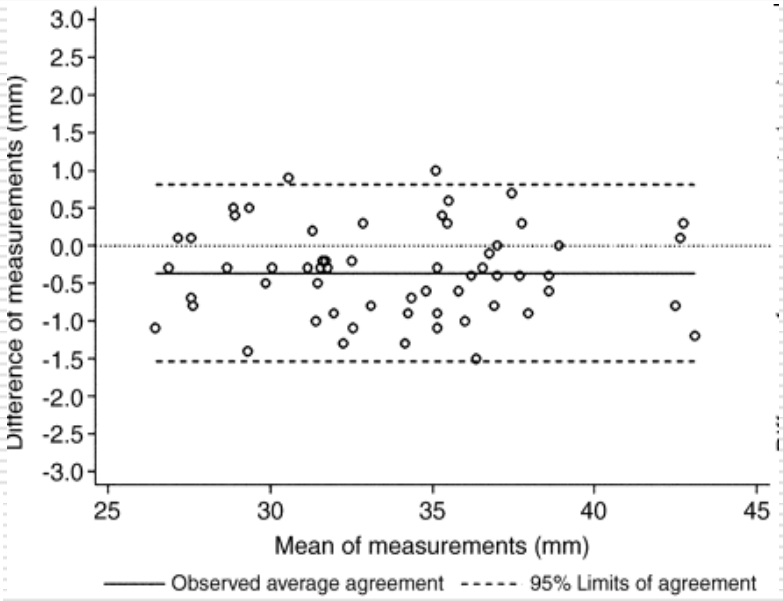
Annual Enlargement and Reproducibility



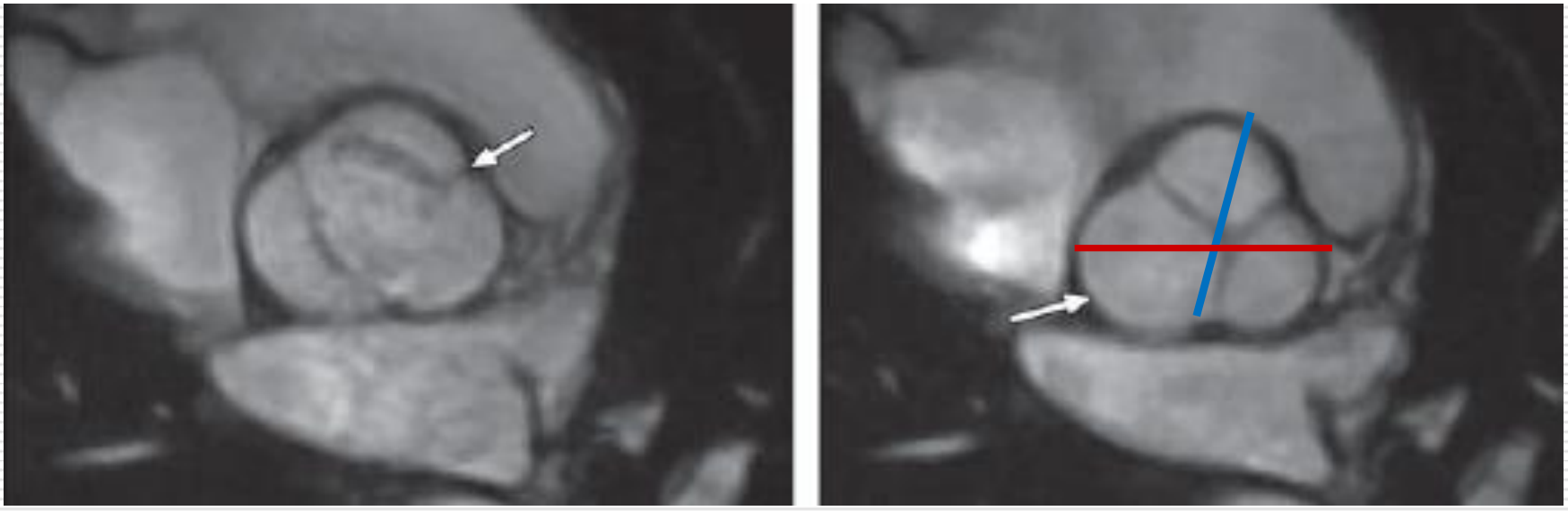
Variability of ascending aorta diameter measurements as assessed with electrocardiography-gated multidetector computerized tomography and computer assisted diagnosis software

Tri-Linh Christian Lu, Elena Rizzo, Pedro Manuel Marques-Vidal, Ludwig Karl von Segesser, Jamshid Dehmeshki and Salah Dine Qanadli

Interact CardioVasc Thorac Surg 2010;10:217-221; originally published online Nov 2,



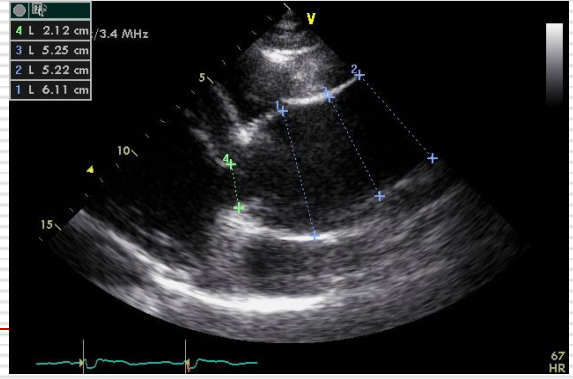
Asymmetry

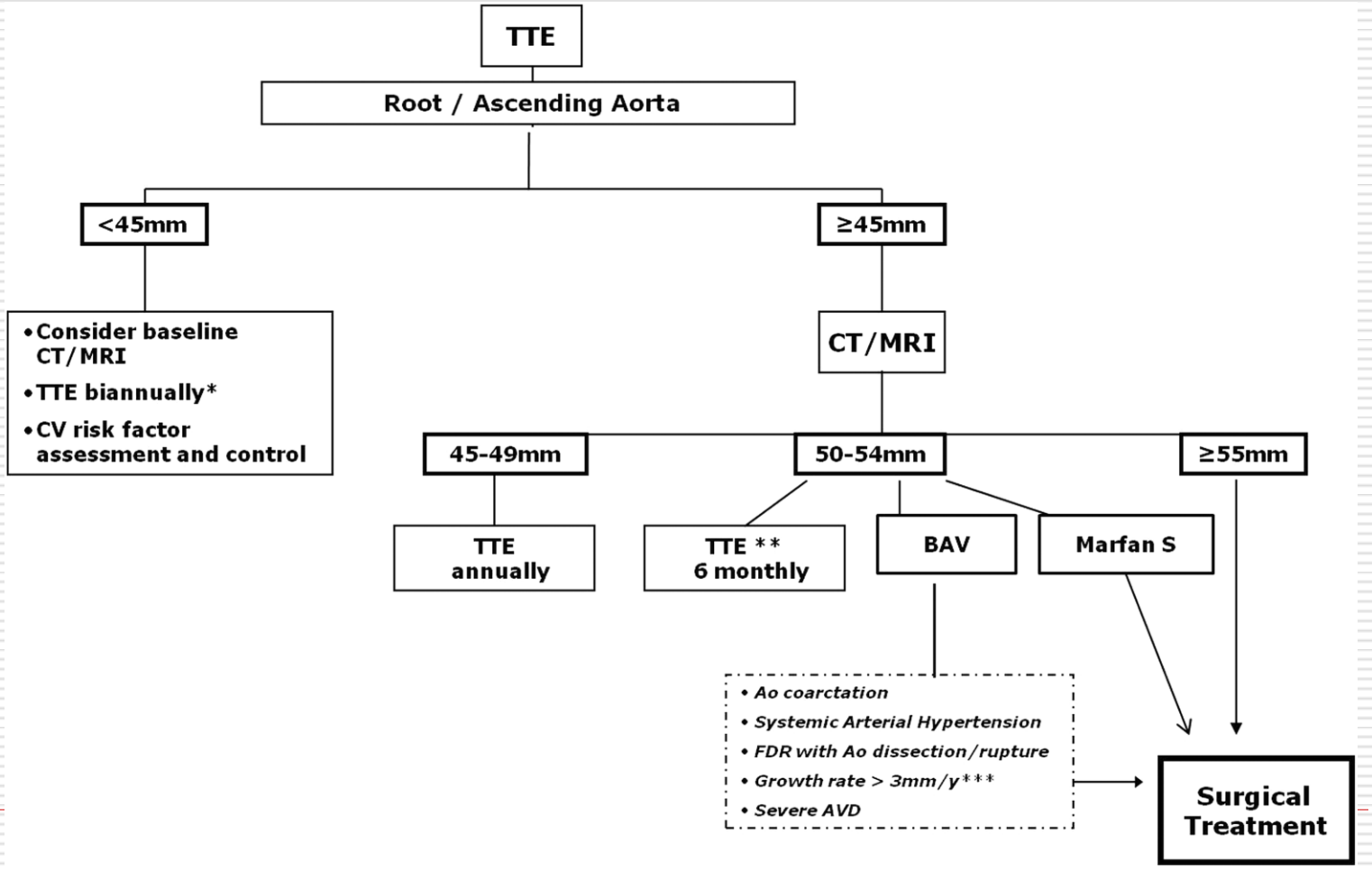


AORTIC DISEASE REVIEW SERIES

Imaging aortic aneurysmal disease

Arturo Evangelista





Heart 2014,100,909-15

Aortic diameter ≥ 55 mm

Aortic diameter ≥ 50 mm

Aortic diameter ≥ 45 mm

Enlargement ≥ 3 mm/y

Beware of the lack of consistency of aortic diameters. Measurement methods should be clear in the report.

Indication for surgery should be confirmed using ECG-gated CT or MRI obtained with 3D data. Annual enlargement should be established by remeasuring previous studies in a side-by-side comparison.

Guidelines are recommendations for the general population; however, we have to individualise indications based on specific characteristics of each patient.

Investigations in AR

ESC/EACTS Guidelines (Vahanian A et al 2012)
EAE recommendations (Lancellotti 2010)

Echocardiography (TTE) is indicated:

- **To confirm the diagnosis and severity of AR**
- **To assess the mechanism of AR and the feasibility for valve repair. TOE may be necessary when valve repair or valve spare surgery is considered.**
- **To assess LV dimensions (indexing in small bsa pts), and systolic function (EF, tissue Doppler imaging and strain rate)**
- **To assess aortic root size (annulus, sinus of V, sino-tubular junction ams ascending aorta)**
- **For periodic reevaluation of LV size and function**

Echocardiographic criteria for the definition of severe valve regurgitation: *an integrative approach*

	Aortic regurgitation	Mitral regurgitation		Tricuspid regurgitation
Semiquantitative				
Vena contracta width (mm)	> 6	≥ 7 (> 8 for biplane)		≥ 7
Upstream vein flow	–	Systolic pulmonary vein flow reversal		Systolic hepatic vein flow reversal
Inflow	–	E-wave dominant ≥ 1.5 m/s		E-wave dominant ≥ 1 m/s
Other	Pressure half-time < 200 ms	TVI mitral/TVI aortic > 1.4		PISA radius > 9 mm
Quantitative		*Primary*	*Secondary*	
EROA (mm^2)	≥ 30	≥ 40	≥ 20	≥ 40
R Vol (ml/beat)	≥ 60	≥ 60	≥ 30	≥ 45
+ enlargement of cardiac chambers/ vessels	LV	LV, LA		RV, RA, inferior vena cava

Adapted from Lancellotti, EAE recommendations. *Eur J Echocardiogr.* 2010;11:223-244 and 307-332

European Heart Journal 2012 - doi:10.1093/eurheartj/ehs109 & European Journal of Cardio-Thoracic Surgery 2012 - doi:10.1093/ejcts/ezs455).

www.escardio.org/guidelines

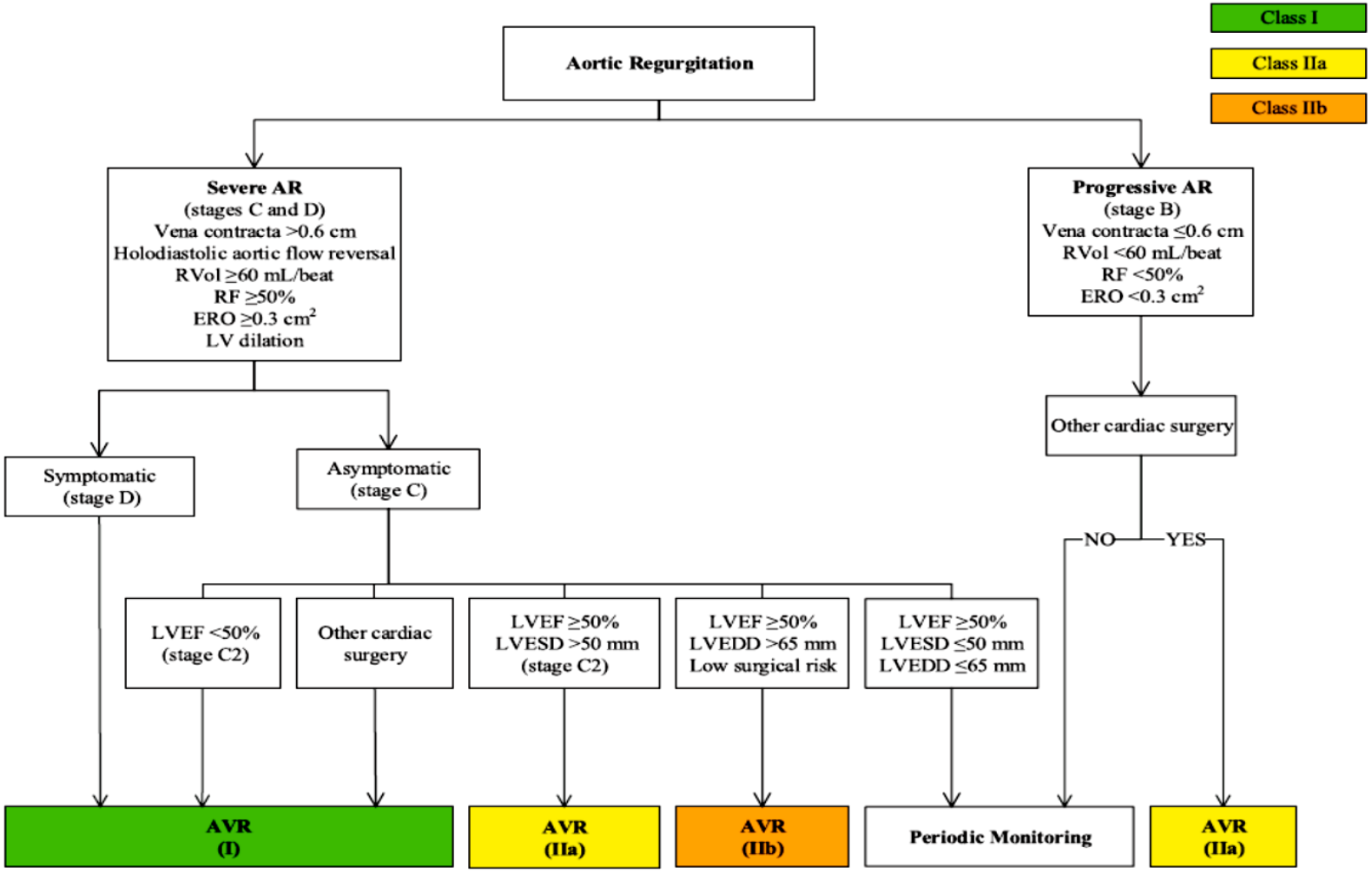
EACTS

EUROPEAN SOCIETY OF CARDIOLOGY®

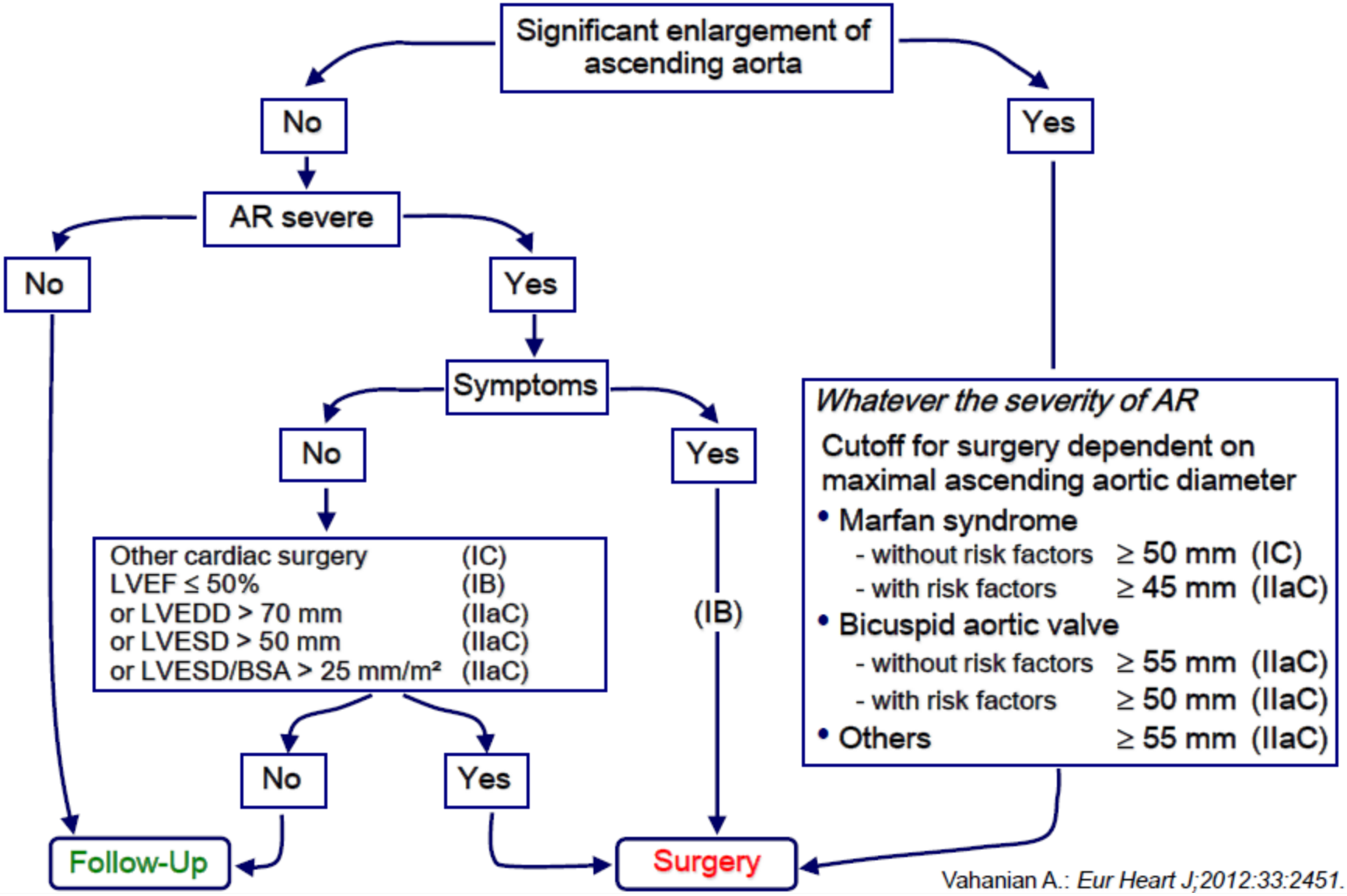
AHA/ACC Guideline

2014 AHA/ACC Guideline for the Management of Patients With Valvular Heart Disease: Executive Summary

A Report of the American College of Cardiology/American Heart Association Task Force on Practice Guidelines



Management of AR – *ESC Guidelines 2012*



Vahanian A.: *Eur Heart J;2012:33:2451.*

Commissural Displacement & Leaflet Separation

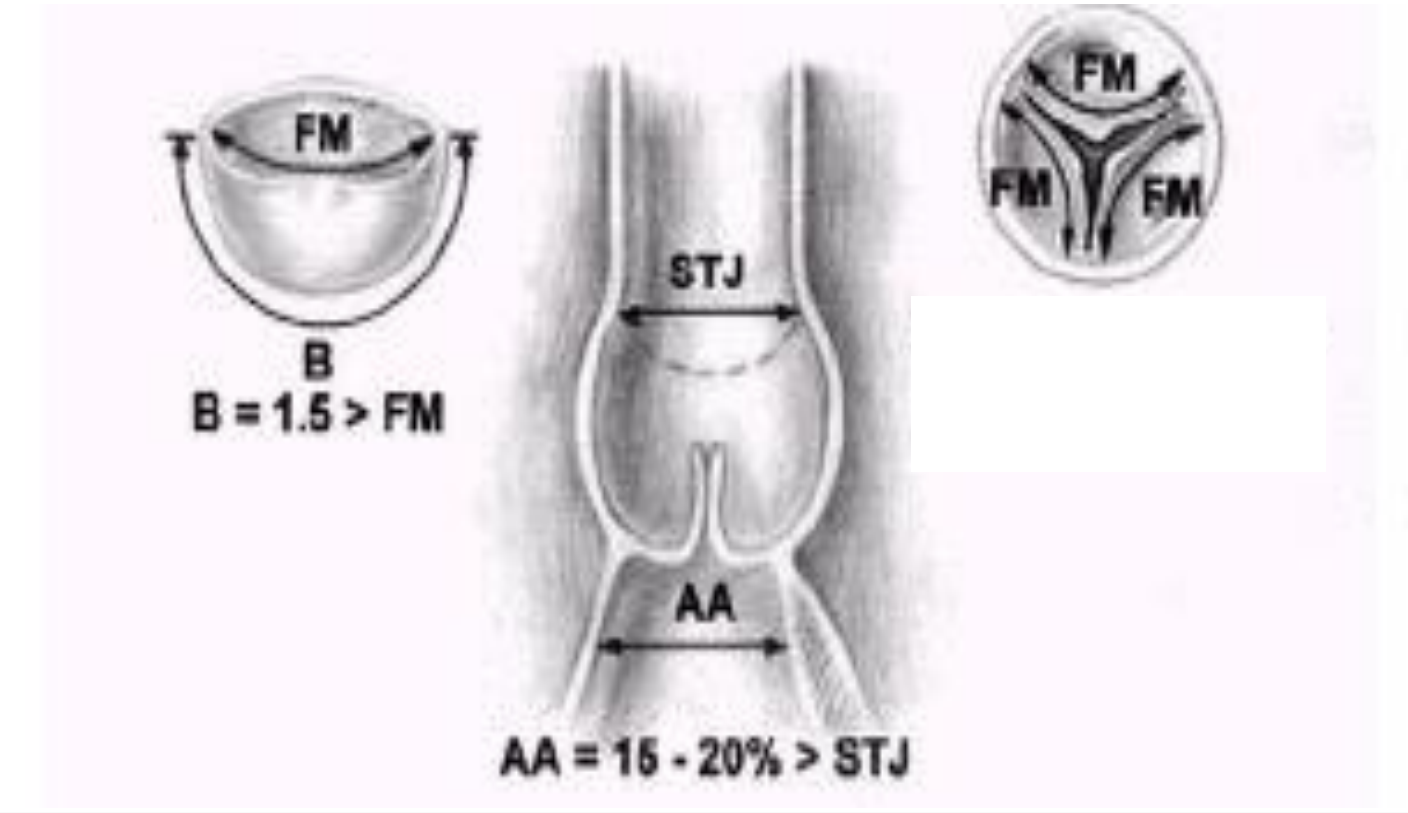
Active and symmetric process

Diameter increases

Leaflet opening is actively assisted by commissural displacement

Free edge of leaflet margin is progressively *pulled* like bow string

Relaciones Geométricas normales de la Raíz Ao



J Thorac Cardiovasc Surg 1994;107:162-170

19. Ascending Aorta and Aortic Arch—Recommendations

Class I

1. All patients with suspected thoracic aortic disease on the basis of family history, symptoms, or physical examination should have the entire thoracic aorta imaged. (Level of evidence C)
2. All patients with a bicuspid aortic valve should undergo imaging of the thoracic aorta [1]. (Level of evidence B)
3. All patients with Marfan syndrome or Loeys-Dietz syndrome or mutations associated with aortic disease or dissection should have the entire aorta imaged and appropriate blood testing performed for genetic mutations [1]. (Level of evidence B)
4. First-degree relatives of young patients with a bicuspid aortic valve or genetic mutation associated aortic disease of the thoracic aortic disease should be advised to be further investigated. (Level of evidence C)
5. All patients for whom planned elective valvular surgery is planned and who have associated thoracic aortic disease should undergo preoperative cardiac catheterization [1]. (Level of evidence B)
6. Additional testing to quantitate a patient's comorbid status and develop a risk profile is recommended. These tests may include for particularly high-risk patients CT of the chest if not already done, PFTs, 24-hour Holter monitoring, noninvasive carotid screening, brain imaging, echocardiography, neurocognitive testing, and assessment of degree of frailty. (Level of evidence C)
7. Intraoperative TEE is recommended for all patients undergoing surgery for thoracic aortic disease. (Level of evidence C)
8. Surgical repair is recommended when the ascending aorta or aortic root exceeds 5.5 cm if the patient has no genetically based aortic disease and is otherwise a suitable candidate for surgery [1]. (Level of evidence B)
9. Patients with genetically associated aortic diseases, including those with a bicuspid aortic valve, should undergo surgery at diameters exceeding 5.0 cm unless a family history of aortic dissection is present, then it is acceptable to lower the threshold to 4.5 cm. Alternatively, patients with a maximal ascending aortic area (Πr^2, cm^2) to height in meters ratio exceeding 10 should be considered for surgery [1]. (Level of evidence B)
10. Patients with a growth rate exceeding 0.5 cm per year should be recommended to undergo surgery if no other limitations apply [1]. (Level of evidence B)
11. For patients with Loeys-Dietz syndrome or confirmed TGFBR1 or TGFBR2 mutation should be evaluated for repair of the aorta when the diameter exceeds 4.2 cm. (Level of evidence C)
12. For patients undergoing cardiac surgery other than for aortic indications, aortic repair is recommended when diameter exceeds 4.5 cm [1]. (Level of evidence B)
13. Aortic diameters should be measured at right angles to the axis of flow, which requires the use of three-dimensional reconstructive software. The maximal diameters at each segment of the aorta should be reported. Echocardiography measures internal diameters while CT and MRI measures external diameters, and thus some allowance should be made for echocardiographic measurements being smaller. (Level of evidence C)
14. Separate valve and ascending aortic replacement are recommended for patients without significant aortic root dilation, for elderly patients, and for young patients with minimal dilation in whom a biological valve is being inserted or a bicuspid valve is being repaired [1]. (Level of evidence B)
15. Patients with Marfan, Loeys-Dietz, and Ehlers-Danlos syndromes and root dilation should undergo excision of the sinuses in combination with a modified David valve reimplantation procedure if technically feasible or insertion of a valve graft conduit [1]. (Level of evidence B)
16. For more complicated arch reconstructions requiring extended periods of circulatory arrest, use of adjunctive brain perfusion techniques is recommended [1]. (Level of evidence B)

Class IIa

1. Regular echocardiography and MRI or CT evaluation after repair of thoracic aortic disease is reasonable. (Level of evidence C)

THE ANNALS OF THORACIC SURGERY

Aortic Valve and Ascending Aorta Guidelines for Management and Quality Measures

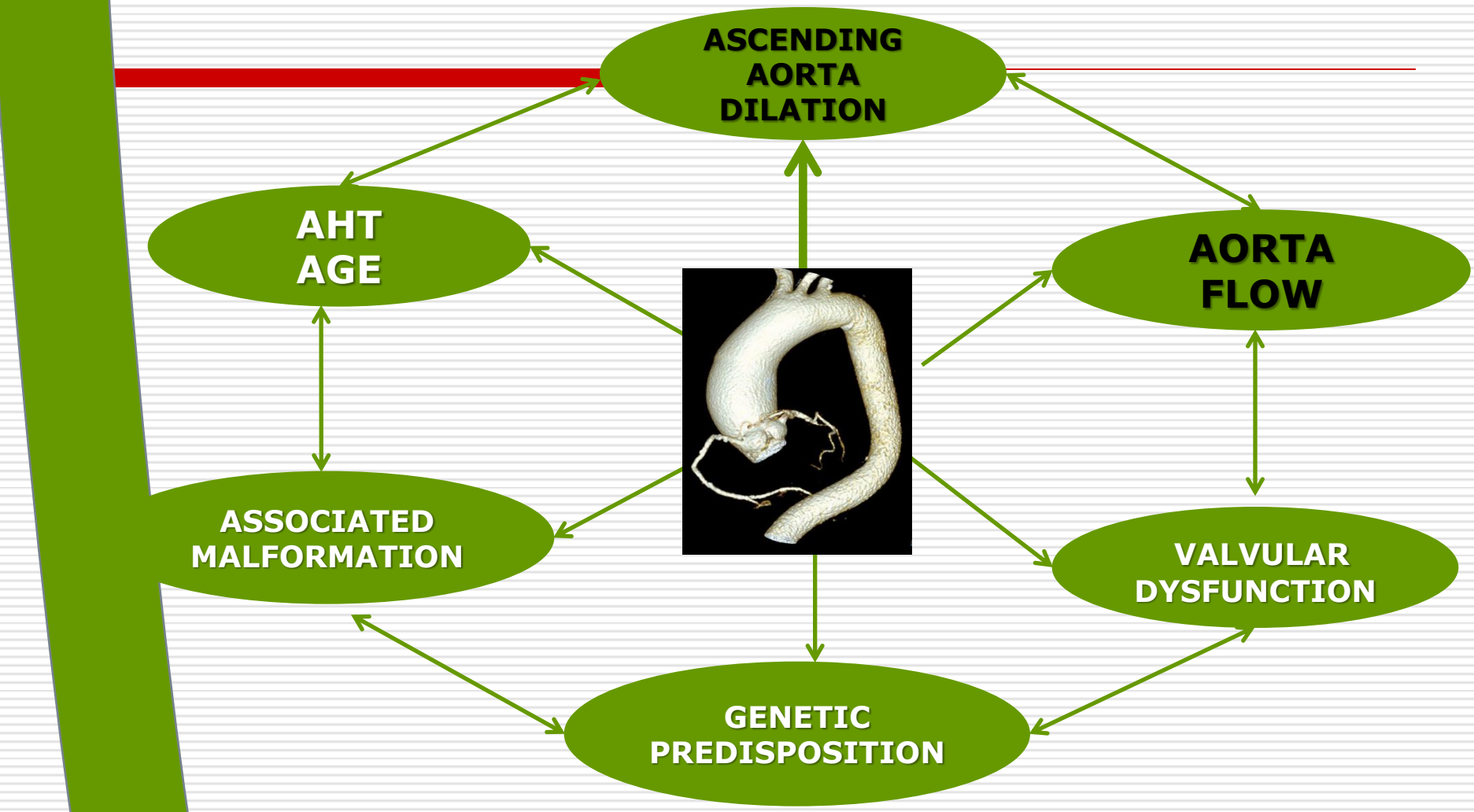
Lars G. Svensson, David H. Adams, Robert O. Bonow, Nicholas T. Kouchoukos, D.

Table 6. Summary of Valve Characteristics

Valve	Ease	Safety	EOA	Durability	EF Survival
BAVR		X			X
Reimplantation		X	X	X	X
Mechanical AVR	X	X	X	X	
Ross			X		
Stentless			X		
Homograft			X		
Hancock/Mosaic	X	X		X	X
Magna		X	X	X	?
Perimount	X	X		X	X
Trifecta		X	X	?	?
Perceval			X	?	?
Intuity			X	?	?
TAVR: PARTNER B	X	X	X	X	X
TAVR: PARTNER A	X		X		
CoreValve	X		X		

AVR = aortic valve replacement; BAVR = bicuspid aortic valve repair; EF = event-free; EOA = effective orifice area; PARTNER = Placement of Aortic Transcatheter trial; TAVR = transcatheter aortic valve replacement.

BICUSPID AORTIC VALVE



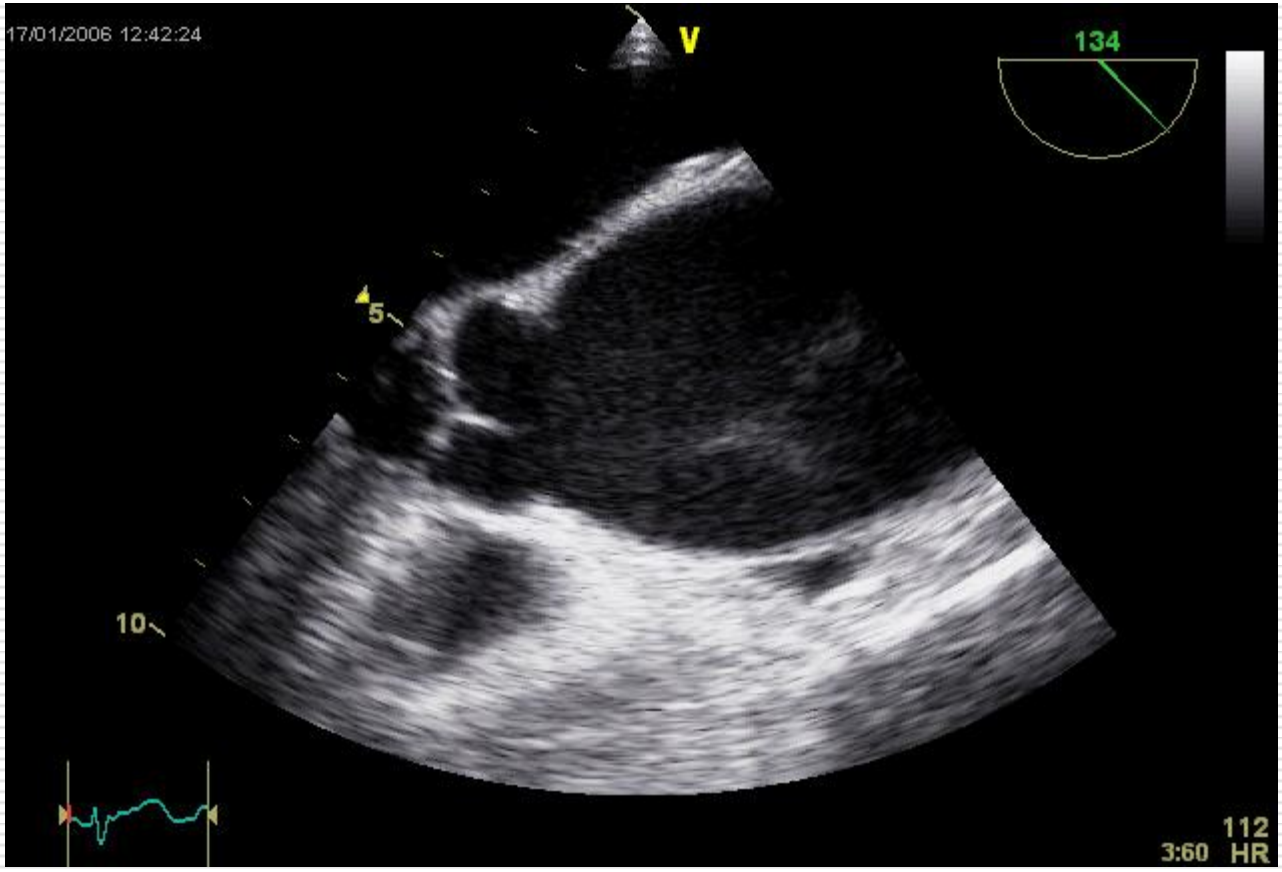
Functional Anatomy of Aortic Regurgitation

Accuracy, Prediction of Surgical Repairability, and Outcome Implications of Transesophageal Echocardiography

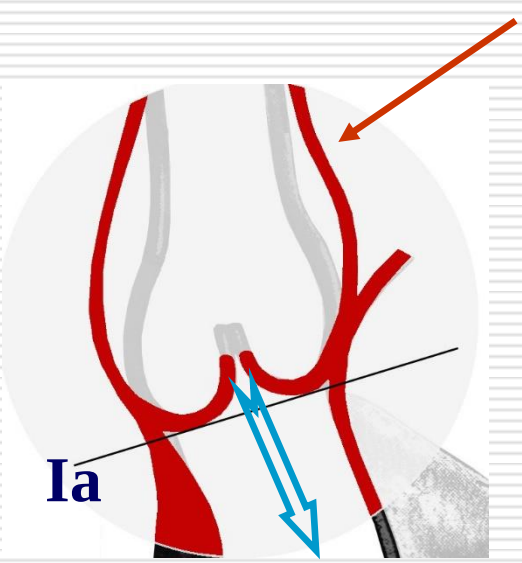
- Tipo I: Dilatación de la Raiz sin afectación de la válvula:
  - Ia: AA y UST
  - Ib: Senos de Valsalva sinuses y UST
  - Ic: Raiz Aórtica
- Tipe II: Prolapso de sigmoideas o fenestración
- Tipo III: Retracción y engrosamiento de sigmoideas

Circulation 2007; 116:I-264-9

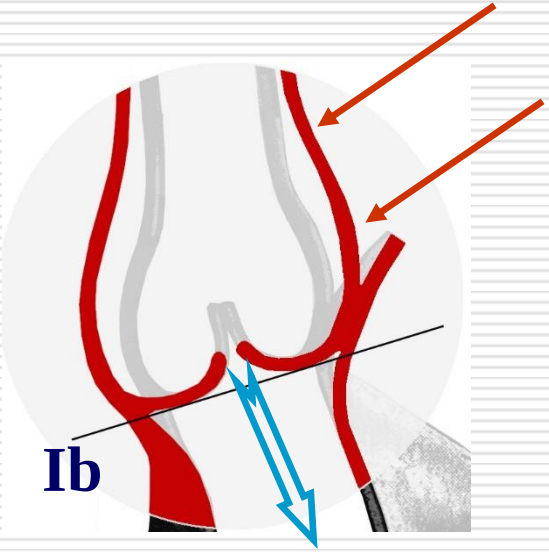
Tipo Ia



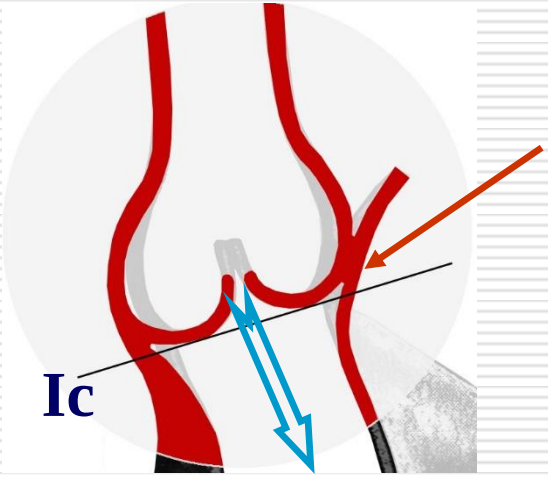
Tipo I:
Dilatación de la Raiz Aórtica con Válvula Normal



Dilatción UST



Dilatación de la Raiz y de UST

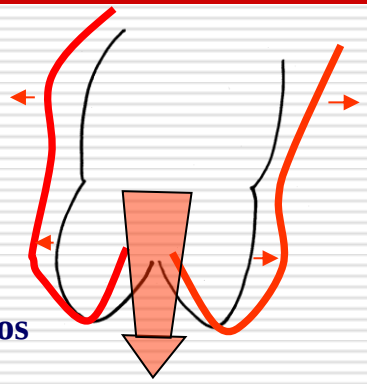


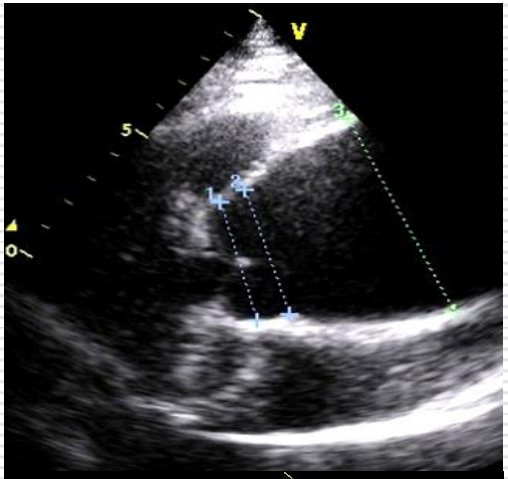
Dilatación del Anillo

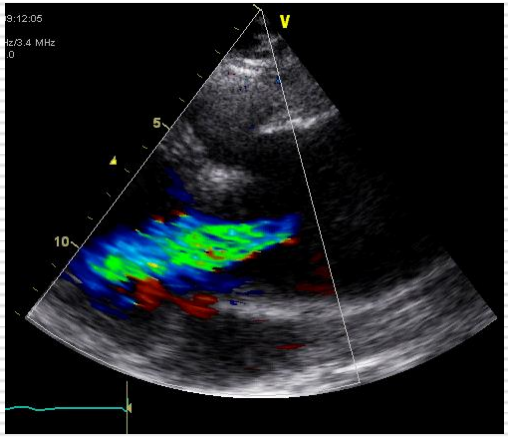
Jet Central

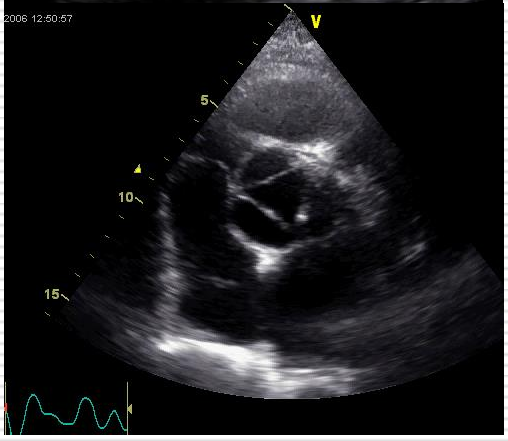
Tipo Ib

Dilatation de la UST y de los Senos Valsalva

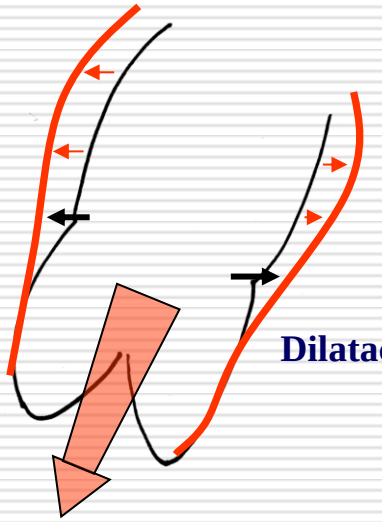


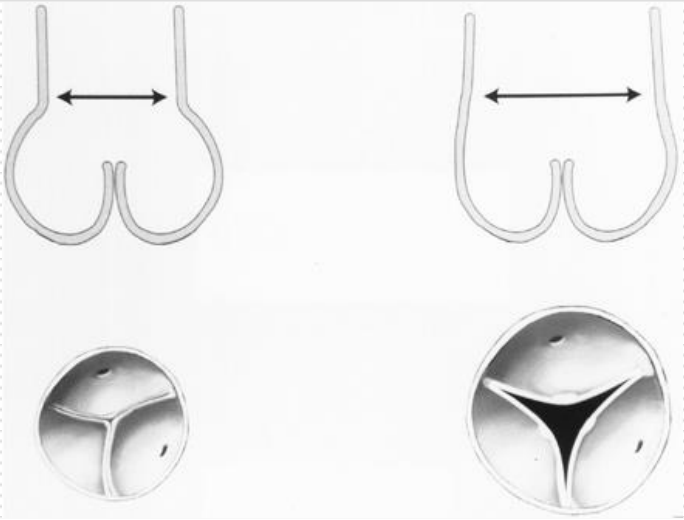






Dilatación de la Raiz Aórtica con Válvula normal Mecanismo de la IAo





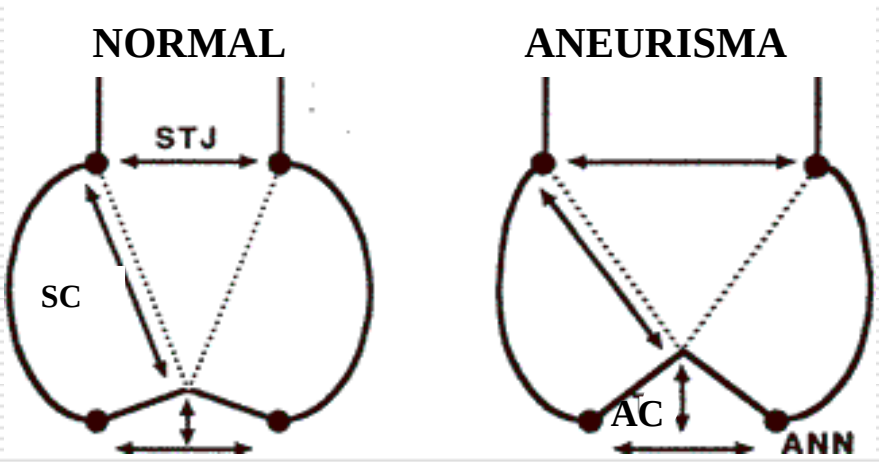
Mecanismo de IAo por dilatación de la UST :

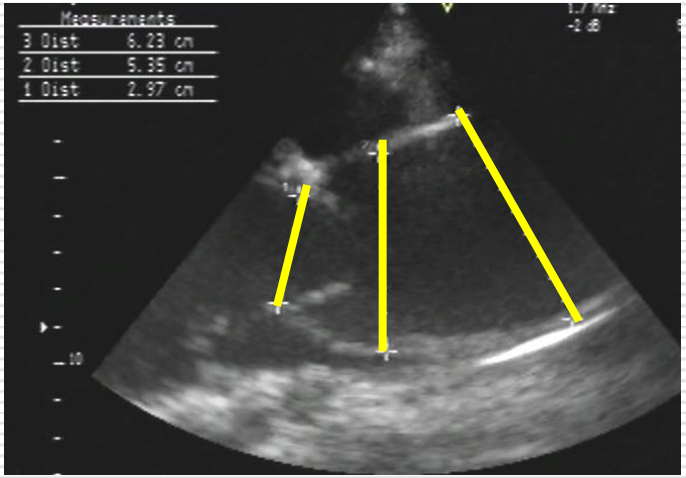
Desplazamiento hacia fuera de las comisuras que restringe el movimiento libre de las sigmoideas y evita el cierre correcto de las sigmoideas.

Furukawa et al. Ann Thorac Sur 1999; 68: 949

Tipo I:
Dilatación de la Raíz Aórtica con Válvula normal
Preservación valvular

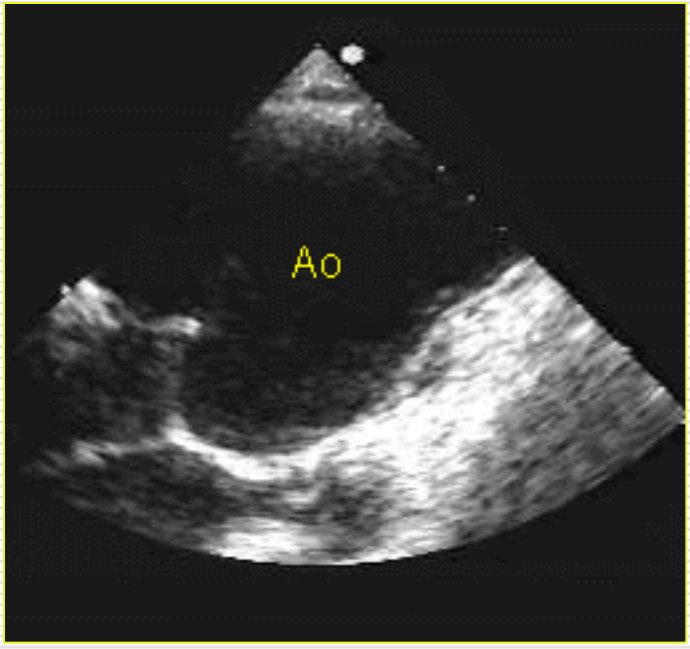
- Severe dilatación de la UST implica UST/anillo > 1.5
- Tenting > 8 mm

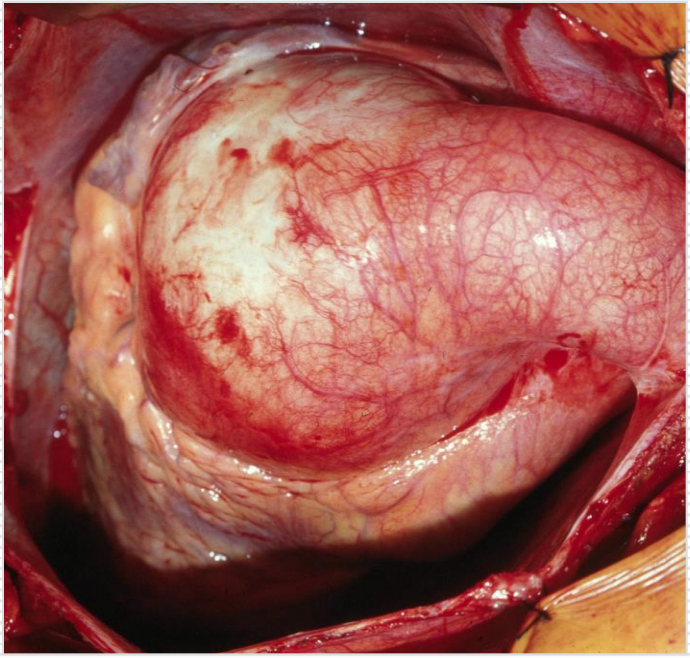




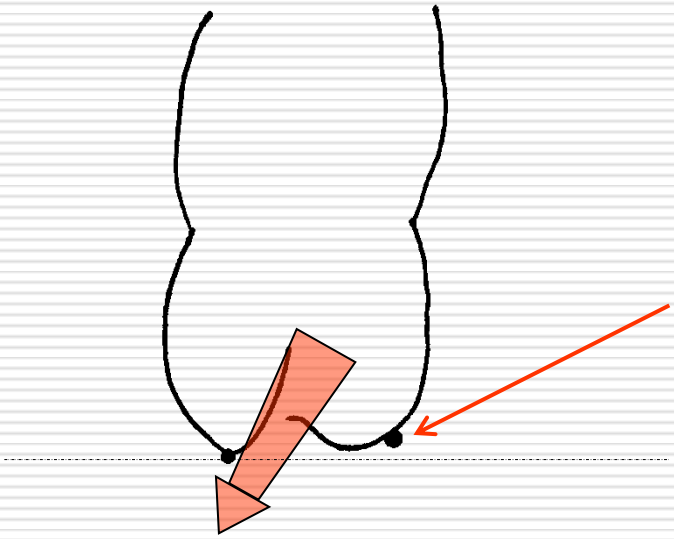
Gallego P et al. Eur Heart J 2003;24(Supp A):701

Ectasia anuloaórtica

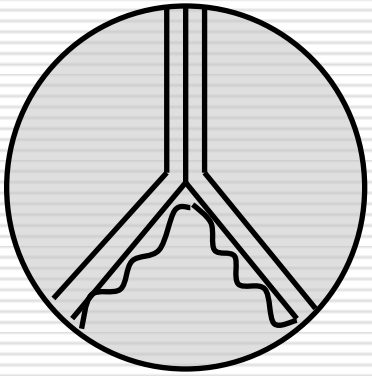


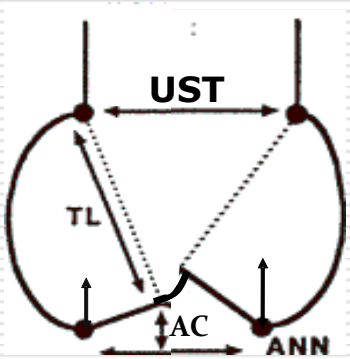


Tipo II: Prolpaso de las sigmoideas



Jet Excéntrico

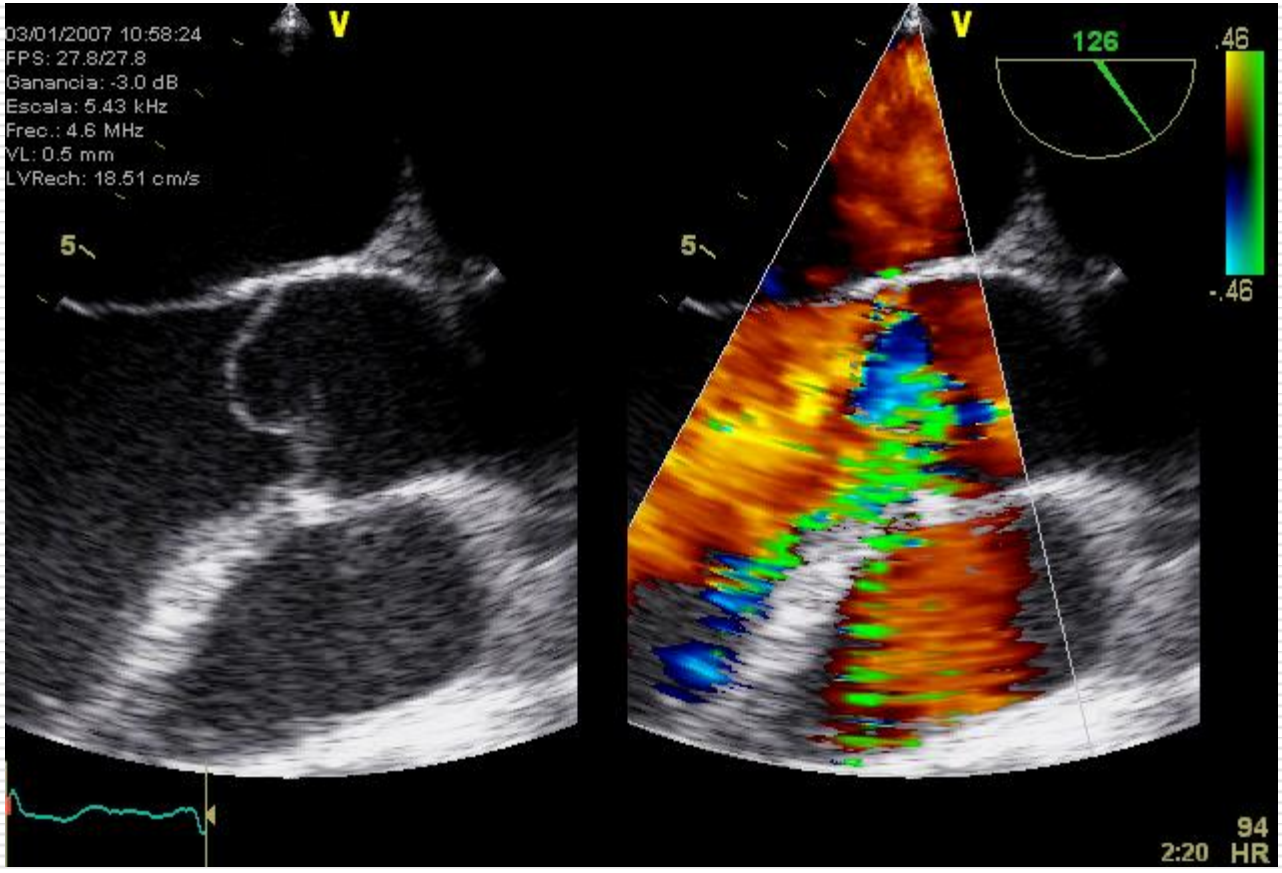


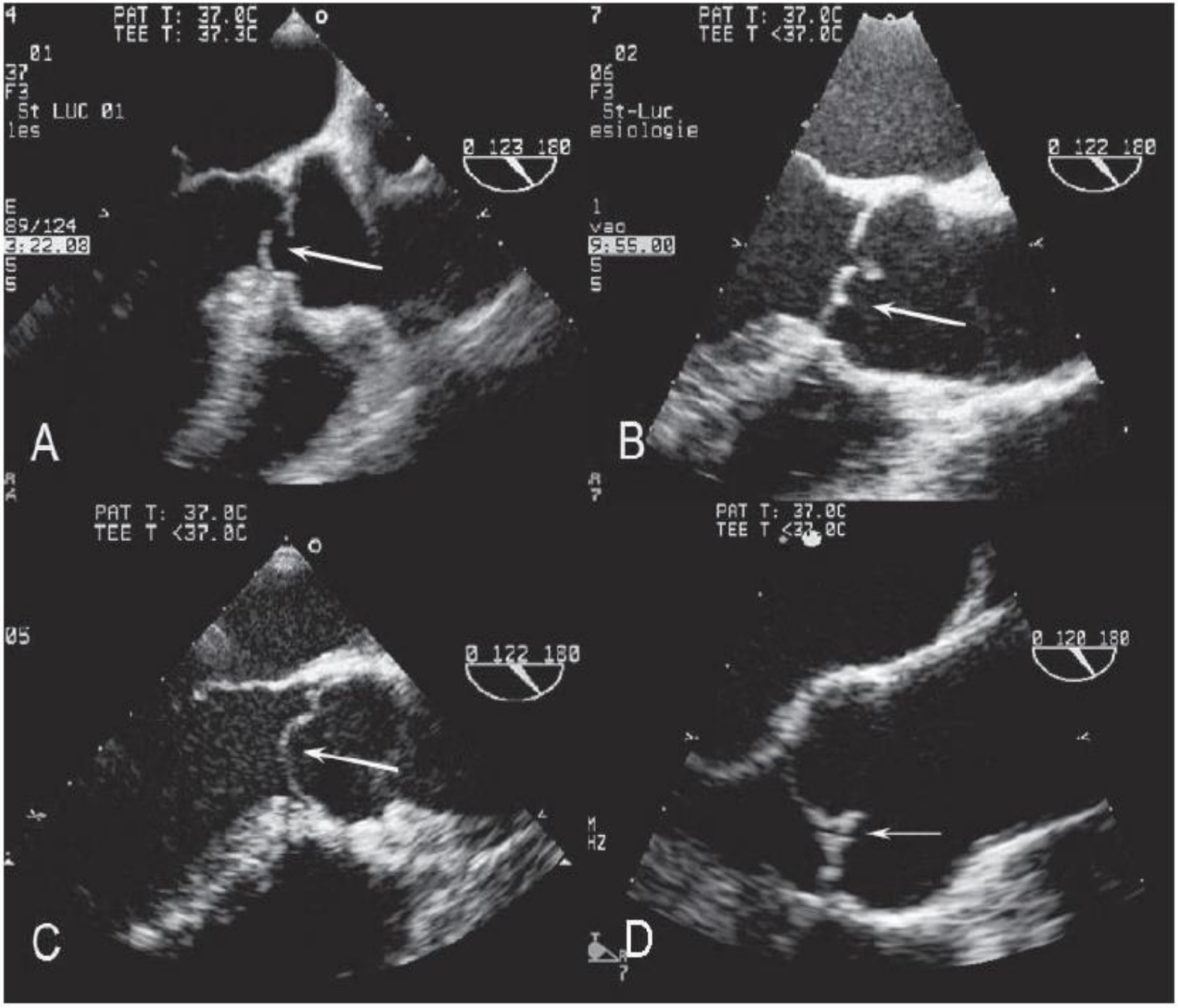


RATIO UST/AN VARIABLE

- **Prolapso de las sigmoideas**
- **Alteraciones geométricas de la raíz**
- **Distriución asimétrica**

Tipo II: Prolapso de las sigmoideas




PAT T: 37.0C
TEE T: 37.3C
St LUC 01
0 123 180
A
PAT T: 37.0C
TEE T <37.0C
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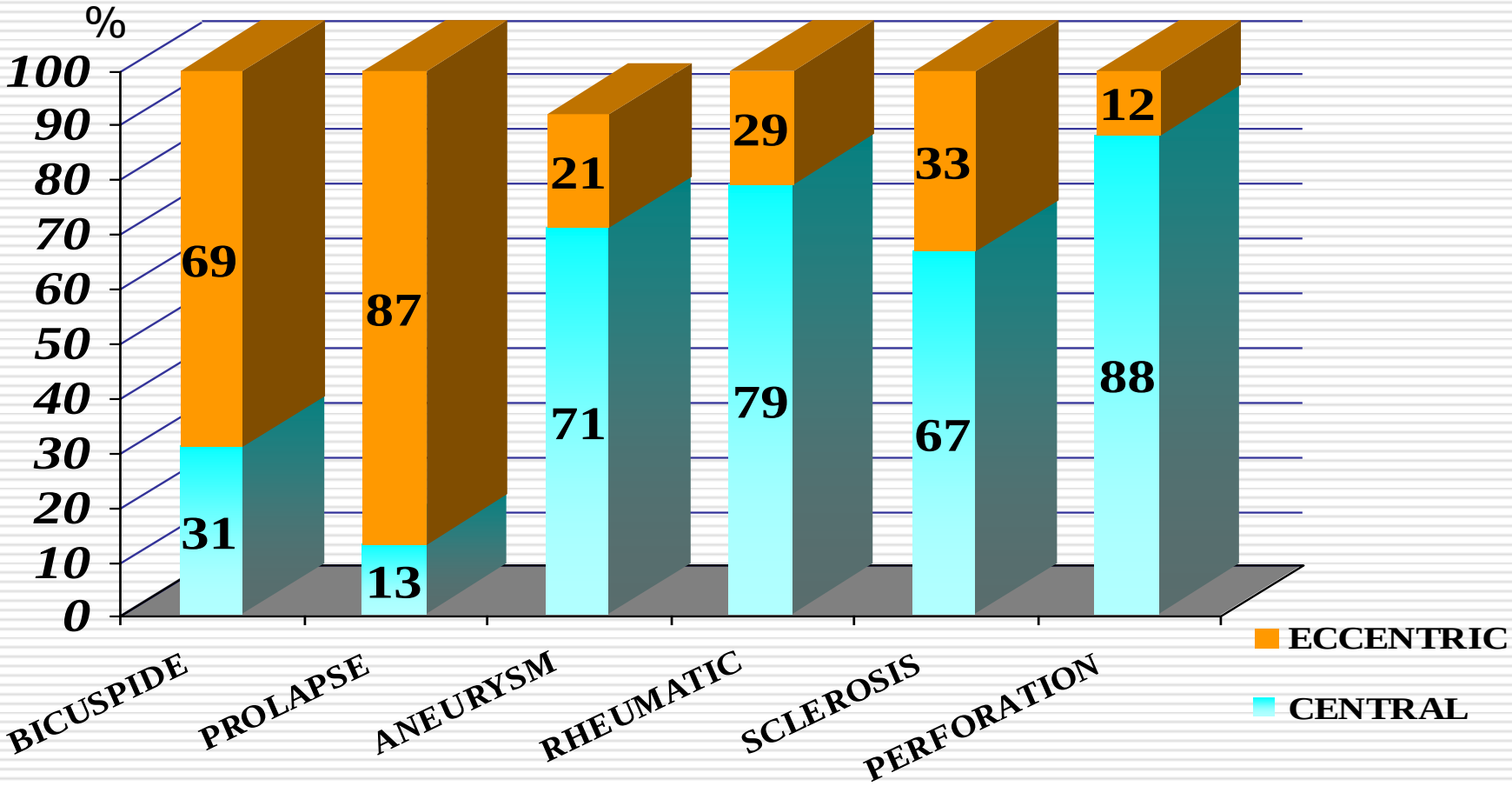
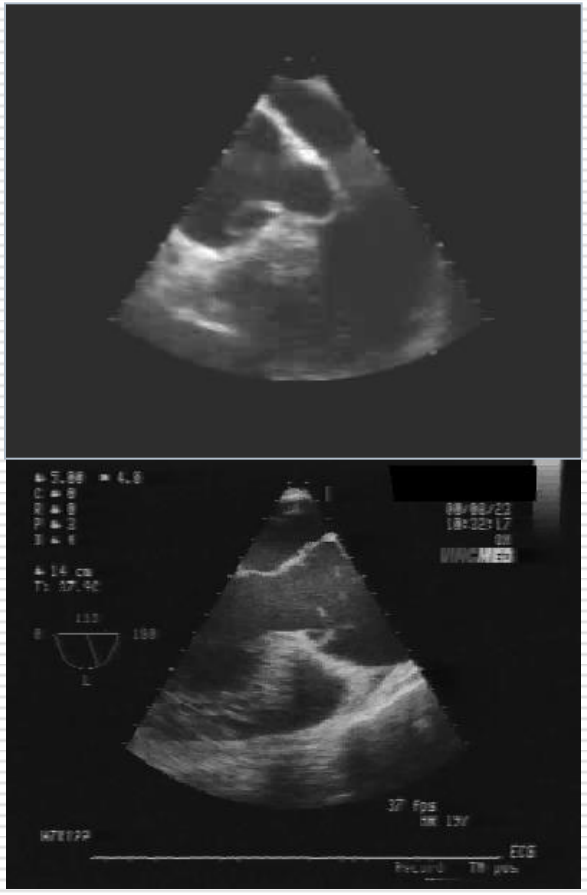
0 122 180
B
PAT T: 37.0C
TEE T <37.0C
0 122 180
C
PAT T: 37.0C
TEE T <37.0C
0 120 180
D

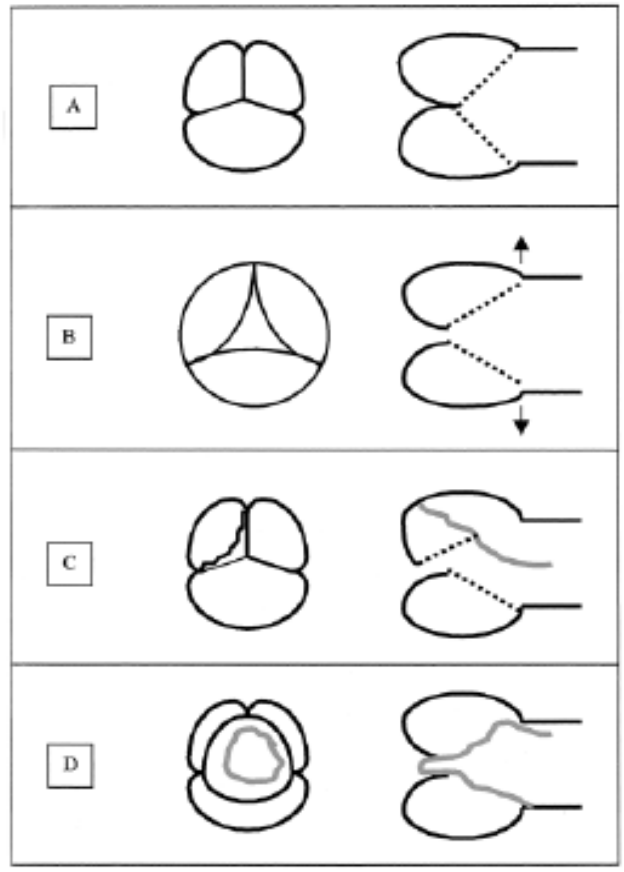
Regurgitant Jet Direction



Cohen G. J Am Soc Echocardiogr 1996;9:508 –15

Aortic Regurgitation secondary to Aortic Dissection





Movsowitz HD, et al. JACC 2000;36:884

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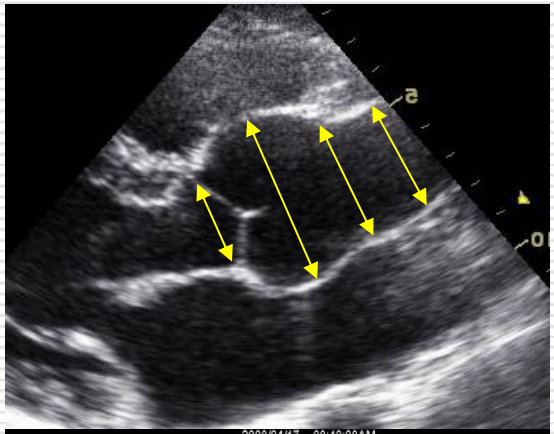
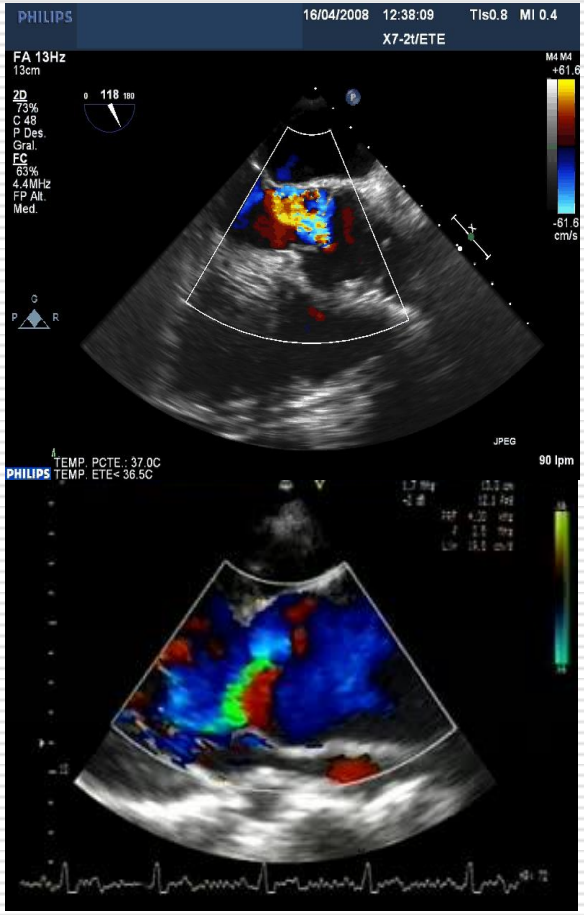
Circulation 2007; 116:I-264-9

Papel de la Ecocardiografía en la Cirugía de la Raiz de Aorta





CONCLUSIONES

- La ETE es una técnica diagnóstica precisa para definir la anatomía funcional de la raíz aórtica y facilita la adecuada selección de los pacientes y la técnica quirúrgica más apropiada

- La técnicas convencionales de Cirugía de Conservación de la válvula aórtica se pueden aplicar con éxito en presencia de "tenting diastólico" y de jets centrales"

- El jet excéntrico sin prolapso sugiere malaalineación de los velos y obliga a realizar procedimeintos asociados