Bicuspidie Aortique et Anévrisme de l'Aorte Ascendante : surveillance et prise en charge

A Vincentelli

Service de Chirurgie Cardiaque

Institut Cœur Poumon

Université de Lille

ufr3s faculté de médecine

CHU LILLE

SFCTCV SOCIÉTÉ FRANÇAISE DE CHIRURGIE THORACIQUE ET CARDIO-VASCULAIRE

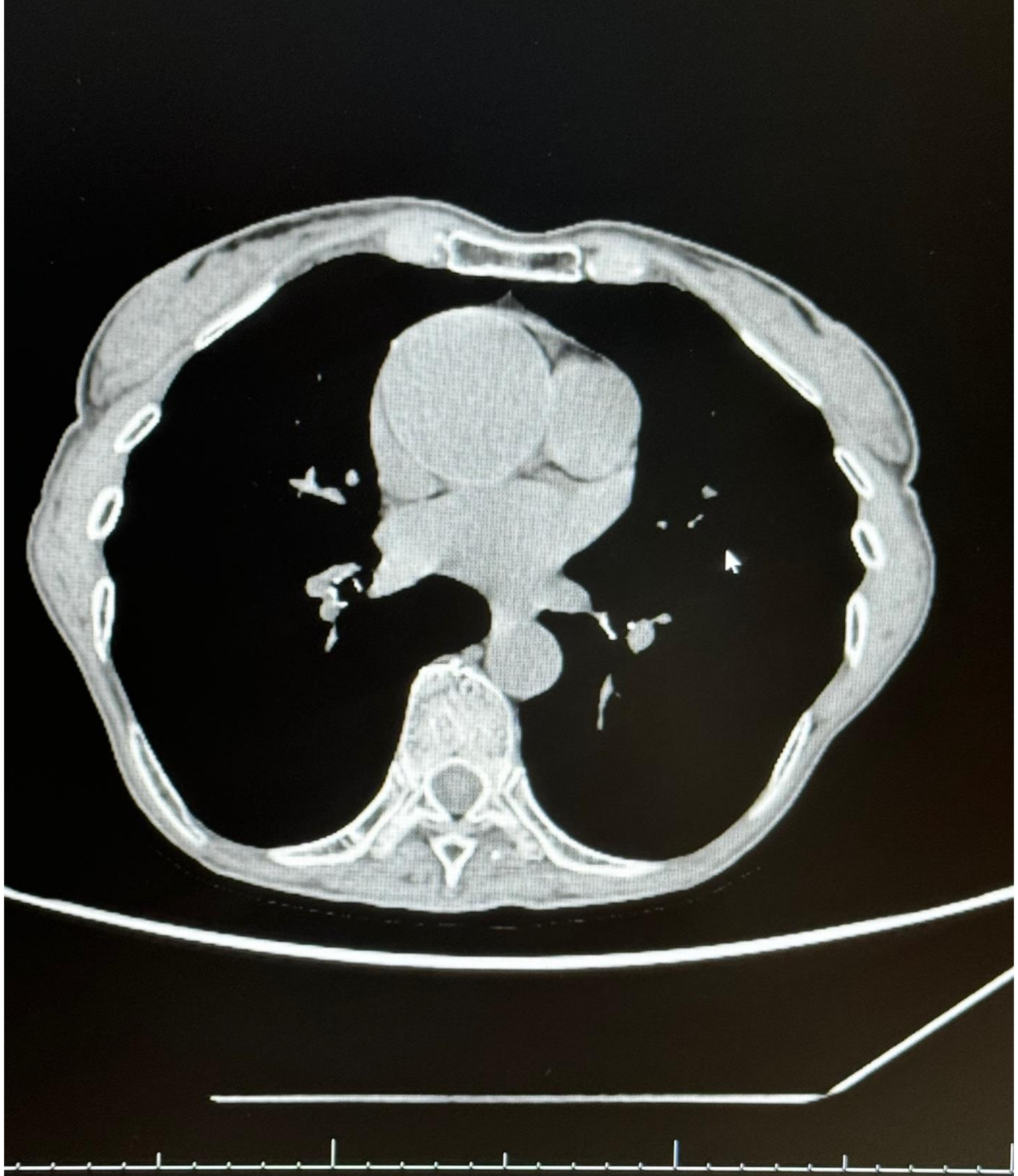
- **Guidelines**

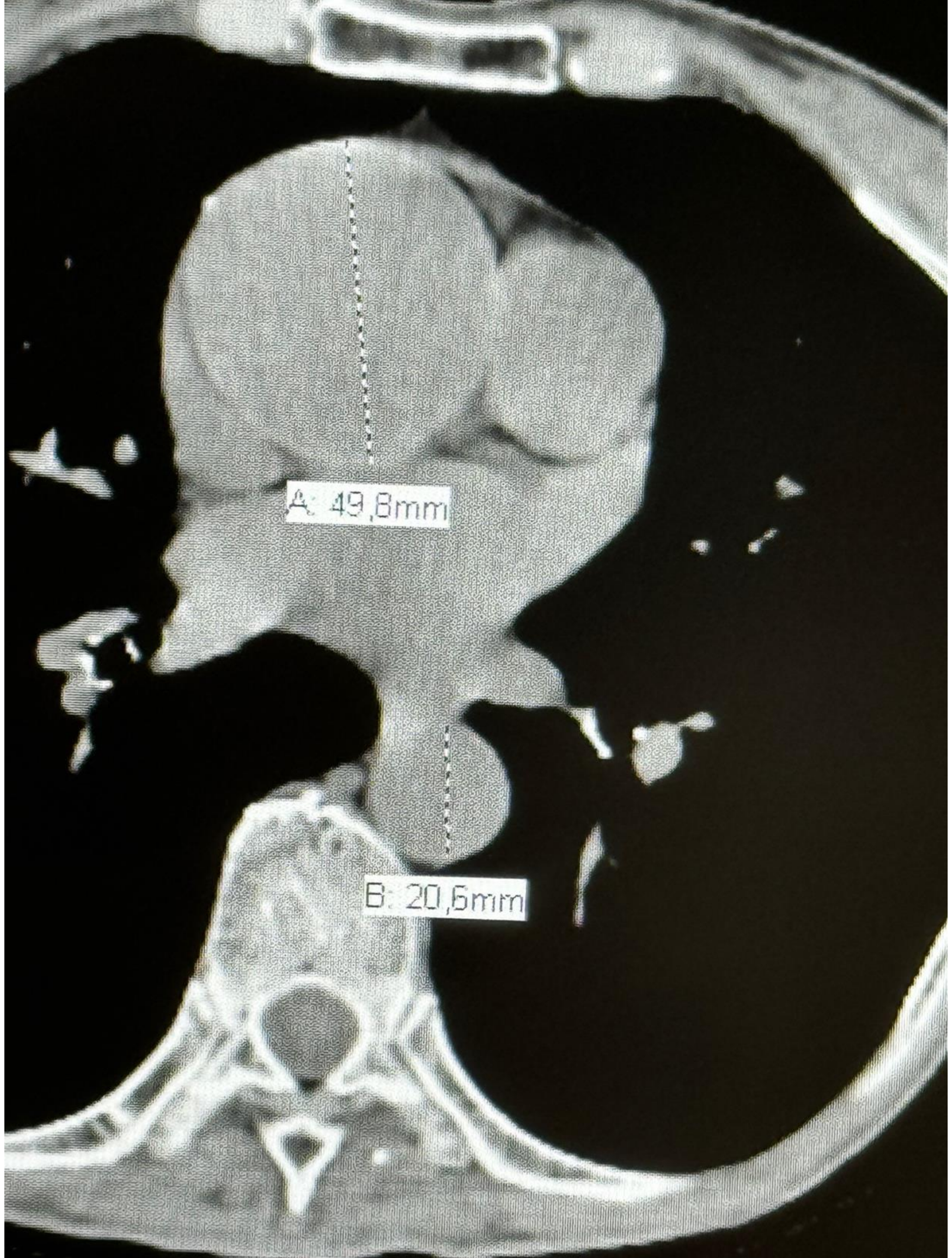
- **Traitement Chirurgical**

    - **Chirurgie réglée : le choix de la technique, du substitut**
    - **Chirurgie des syndromes aortiques aigus**

- **Conclusion**

- **Femme 70 ans, HTA, 1m77, 54 kg**
- **Découverte fortuite dilatation Aorte Ascendante segment 1**
- **Valve aortique semble tricuspide**




A: 49,8mm
B: 20,6mm

Circulation

ACC/AHA CLINICAL PRACTICE GUIDELINE

2022 ACC/AHA Guideline for the Diagnosis and Management of Aortic Disease: A Report of the American Heart Association/American College of Cardiology Joint Committee on Clinical Practice Guidelines

Writing Committee Members*

Eric M. Isselbacher, MD, MSc, FACC, Chair; Ourania Preventza, MD, MBA, Vice Chair; James Hamilton Black III, MD, DFSVS, Vice Chair; John G. Augoustides, MD, FAHA†; Adam W. Beck, MD, DFSVS; Michael A. Bolen, MD‡; Alan C. Braverman, MD, FACC; Bruce E. Bray, MD, FACC§; Maya M. Brown-Zimmerman, MPH||; Edward P. Chen, MD, FAHA; Tyrone J. Collins, MD, MSCAI, FACC, FAHA, FSVM¶; Abe DeAnda Jr, MD, FAHA; Christina L. Fanola, MD, MSc; Leonard N. Girardi, MD, FAHA#; Caitlin W. Hicks, MD, MS, FSVS**; Dawn S. Hui, MD; William Schuyler Jones, MD, FACC††; Vidyasagar Kalahasti, MD, FACC; Karen M. Kim, MD, MS‡‡; Dianna M. Milewicz, MD, PhD; Gustavo S. Oderich, MD; Laura Ogbechie, MSN; Susan B. Promes, MD, MBA; Elsie Gyang Ross, MD, MSc; Marc L. Schermerhorn, MD, DFSVS§§; Sabrina Singleton Times, DHSc, MPH||||; Elaine E. Tseng, MD, FAHA; Grace J. Wang, MD, MSCE; Y. Joseph Woo, MD, FACC, FAHA††

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GUIDELINES

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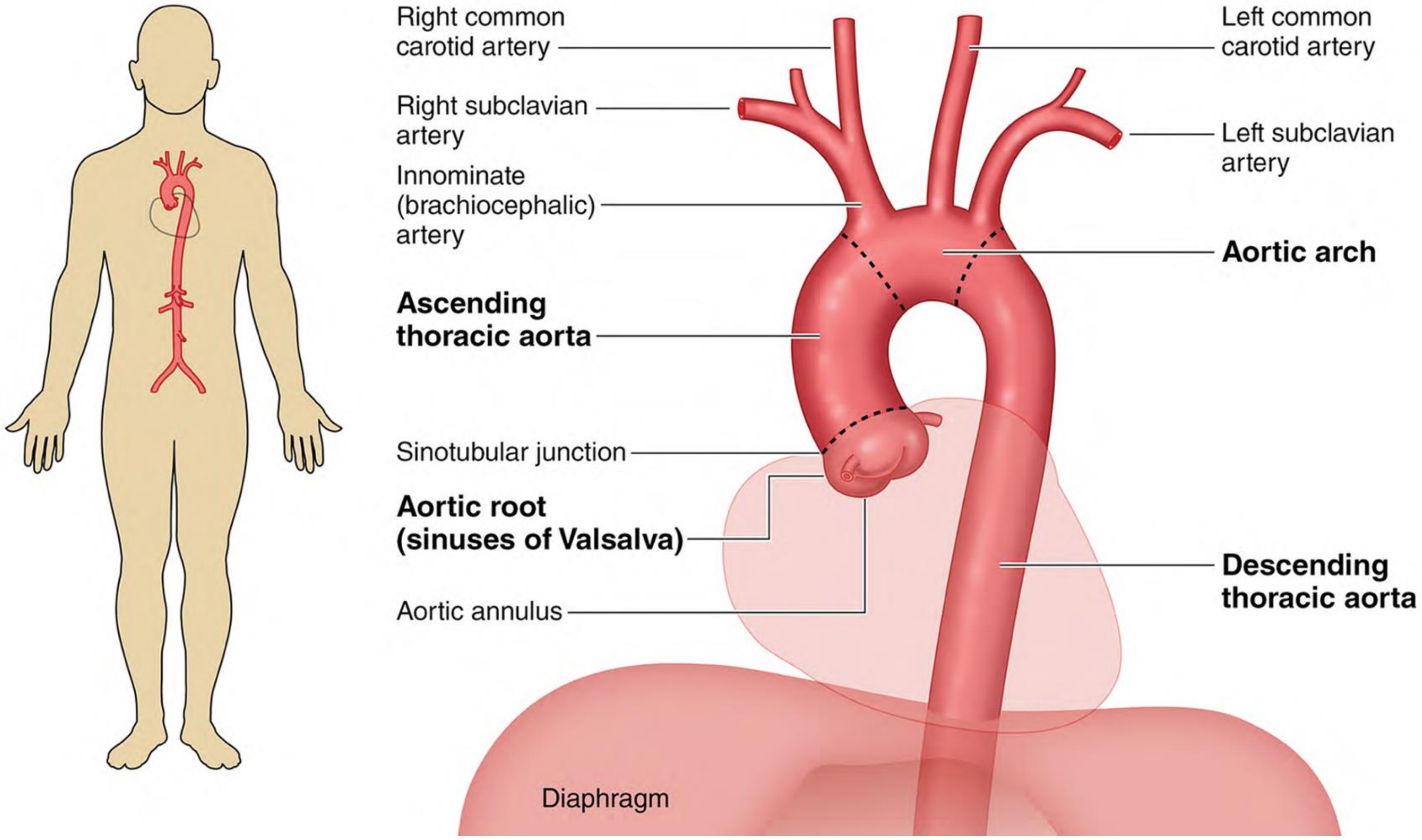
EACTS/STS Guidelines for diagnosing and treating acute and chronic syndromes of the aortic organ

Authors/Task Force Members: Martin Czerny [a,b,*,†] (Co-Chairperson) (Germany), Martin Grabenwöger [c,d,*,†] (Co-Chairperson) (Austria), Tim Berger [a,b] (Task Force Coordinator), Victor Aboyans [e,f] (France), Alessandro Della Corte [g,h] (Italy), Edward P. Chen [i] (USA), Nimesh D. Desai [j] (USA), Julia Dumfarth [k] (Austria), John A. Elefteriades [l] (USA), Christian D. Etz [m] (Germany), Karen M. Kim [n] (USA), Maximilian Kreibich [a,b] (Germany), Mario Lescan [o] (Germany), Luca Di Marco [p] (Italy), Andreas Martens [q,r] (Germany), Carlos A. Mestres [s] (South Africa), Milan Milojevic [t] (Serbia), Christoph A. Nienaber [u,v] (UK), Gabriele Piffaretti [w] (Italy), Ourania Preventza [x] (USA), Eduard Quintana [y] (Spain), Bartosz Rylski [a,b] (Germany), Christopher L. Schlett [b,z] (Germany), Florian Schoenhoff [aa] (Switzerland), Santi Trimarchi [ab] (Italy) and Konstantinos Tsagakis [ac] (Germany), EACTS/STS Scientific Document Group

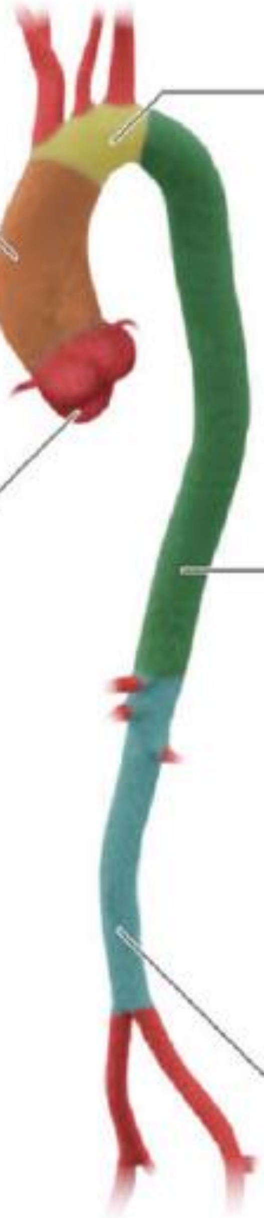

Right common
carotid artery
Left common
carotid artery
Right subclavian
artery
Left subclavian
artery
Innominate
(brachiocephalic)
artery
Aortic arch
Ascending
thoracic aorta
Sinotubular junction
Aortic root
(sinuses of Valsalva)
Descending
thoracic aorta
Aortic annulus
Diaphragm

Ascending aorta

Decreasing order of prevalence/use	Pathologies	Imaging	Treatment
	BAV	CT	Surgical
	Idiopathic MD	TTE	(Endovascular)
	Atherosclerosis	TOE	
	Iatrogenic injury	MRI	

Aortic root

Decreasing order of prevalence/use	Pathologies	Imaging	Treatment
	HTAD	TTE	Surgical
	Idiopathic MD	TOE	
	BAV	CT	
	Iatrogenic injury	MRI	



Aortic arch

Decreasing order of prevalence/use	Pathologies	Imaging	Treatment
	Atherosclerosis	CT	Surgical
	Idiopathic MD	MRI	Hybrid
	Inflammatory	TOE	Endovascular
	Kommerell diverticulum		

Descending thoracic aorta

Decreasing order of prevalence/use	Pathologies	Imaging	Treatment
	Atherosclerosis	CT	Endovascular
	Post-dissection aneurysm	TOE	Surgical
	Coarctation	MRI	
	Traumatic injury		
	Inflammatory		

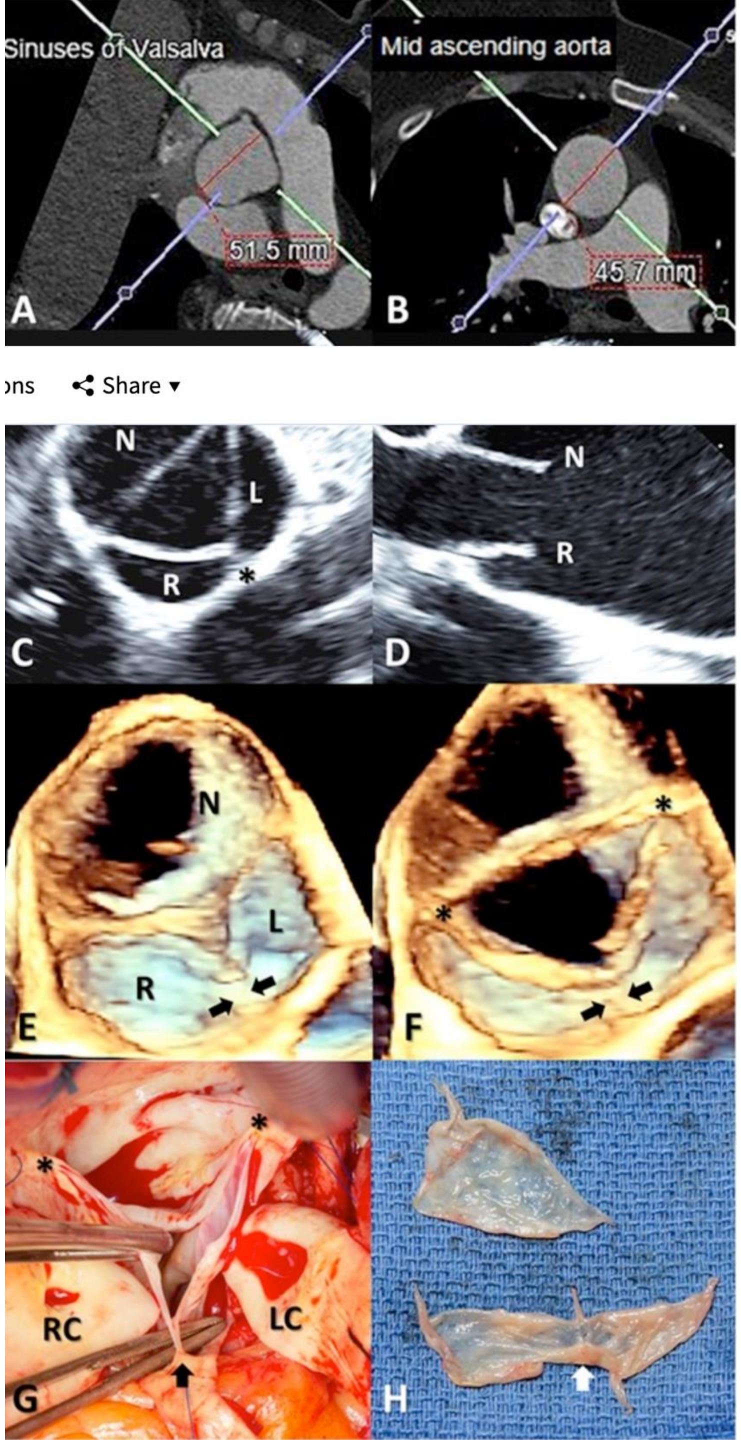
Abdominal aorta

Decreasing order of prevalence/use	Pathologies	Imaging	Treatment
	Atherosclerosis	A-US	Endovascular
	Inflammatory	CT	Surgical
		MRI	

Central Figure: The Aortic Organ.
Main pathologies, most used imaging modalities and treatment options for each segment of the aorta.

A-US= abdominal ultrasound; BAV= bicuspid aortic valve; CT= computed tomography; HTAD= heritable thoracic aortic disease; MD= medial degeneration; MRI= magnetic resonance imaging; TOE= trans-oesophageal echocardiography; TTE= trans-thoracic echocardiography

Formes « frustres » BICUSPIDIE



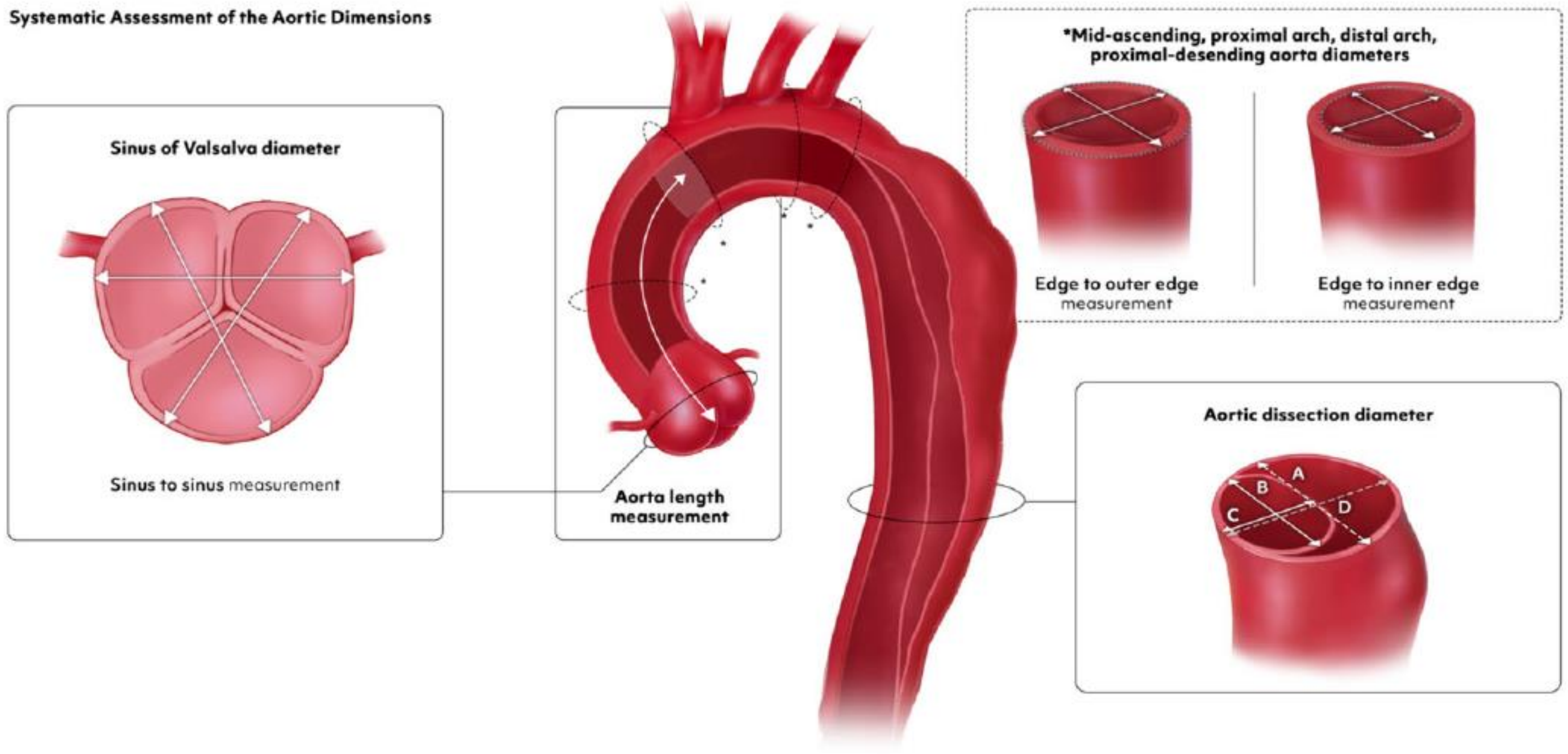
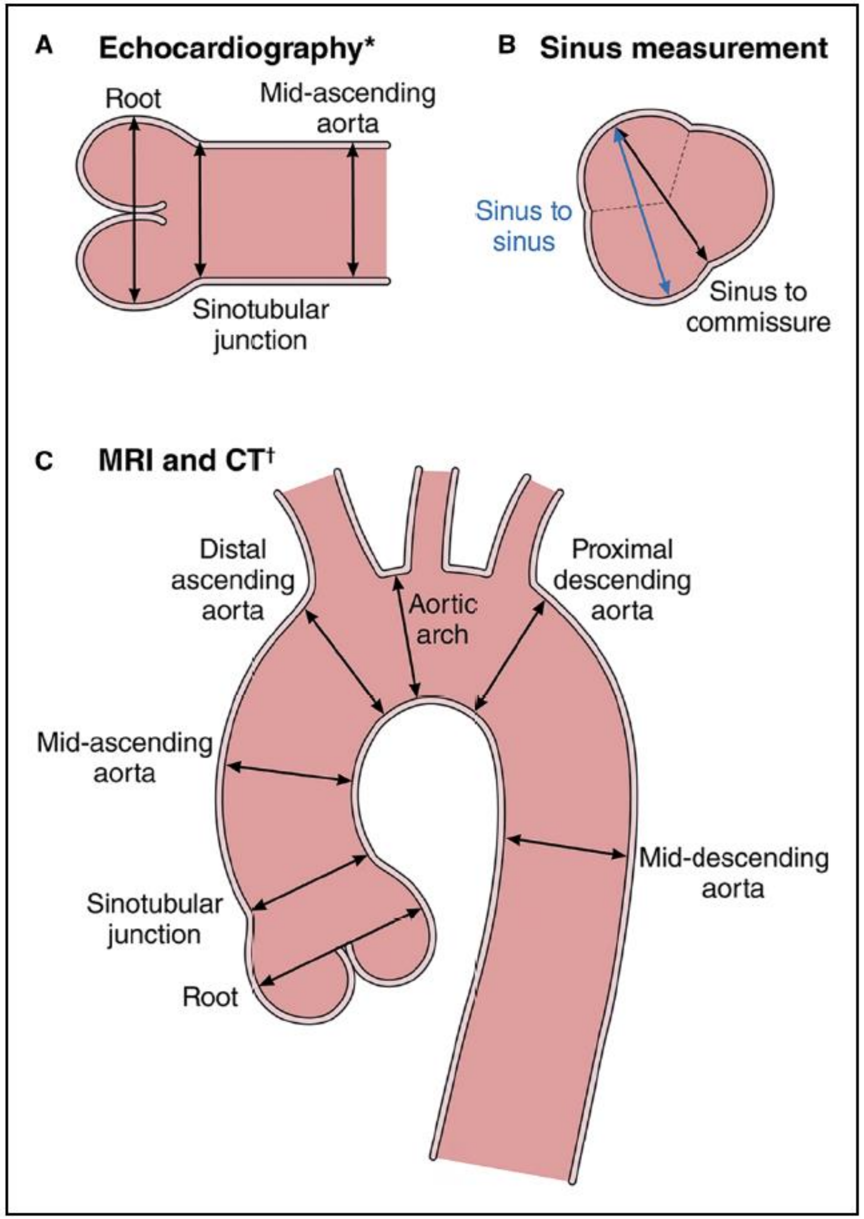


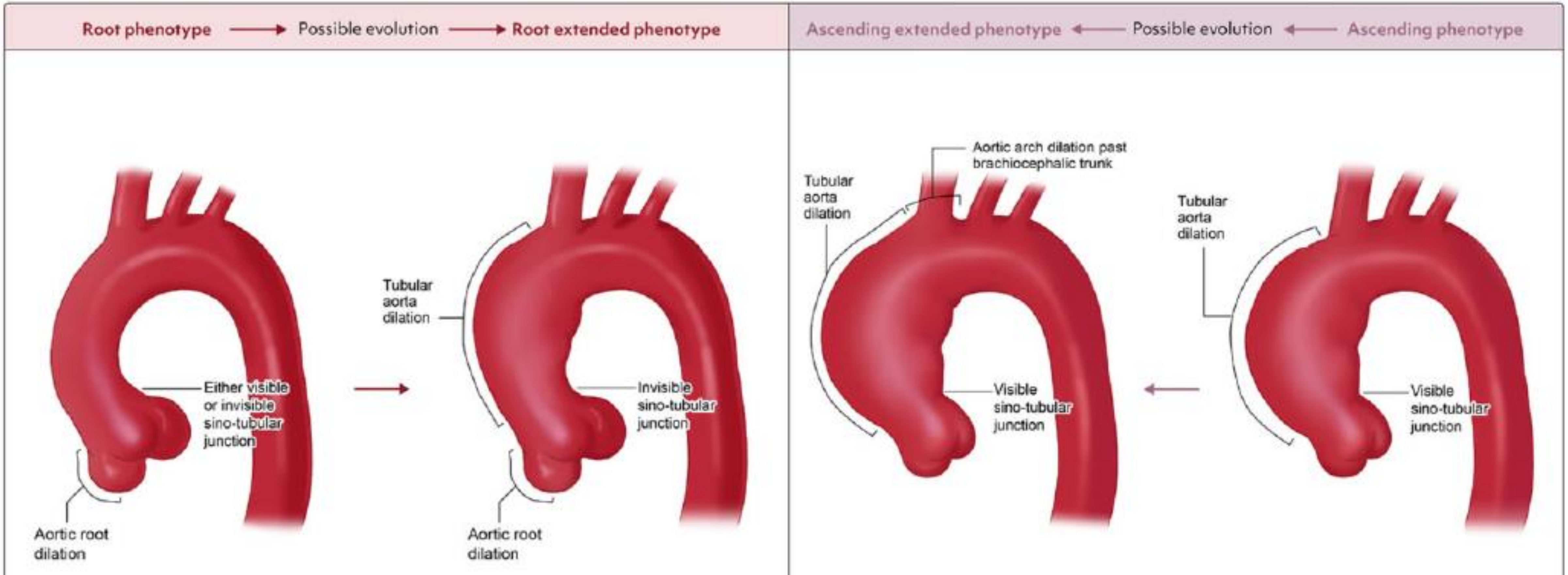
Figure 10: Systemic assessment of aortic dimensions. (A) Maximum total aortic diameter, (B) maximum true lumen diameter, (C) minimum true lumen diameter and (D) minimum total aortic diameter.


A
Echocardiography*
Root
Mid-ascending aorta
Sinotubular junction
B
Sinus measurement
Sinus to sinus
Sinus to commissure
C
MRI and CT†
Distal ascending aorta
Aortic arch
Proximal descending aorta
Mid-ascending aorta
Mid-descending aorta
Sinotubular junction
Root

S-S
56.1 mm
ROI
A = 2442 mm2
C = 183 mm
min = -11 HU
max = 382 HU
avg = 311 HU
stdev = 40 HU
S-C
51.1 mm

Les bicuspidies aortiques

Bicuspid aortic valve aortopathy (BAVA) phenotypes



- Patients are more likely to be younger
- Patients are likely to be taller and male
- Dilation of the sinus of Valsalva and aortic regurgitation often in parallel
- Present right-left cusp fusion
- Rare with right-noncoronary cusp fusion

- Patients are more likely to be older
- Pathology not limited to either sex
- Associated with aortic stenosis and hypertension
- Present right-left cusp fusion and right-noncoronary cusp fusion

Recommendations for BAV Aortopathy Interventions: Replacement of the Aorta in Patients With BAV
Referenced studies that support the recommendations are summarized in the Online Data Supplement.

COR	LOE	Recommendations
1	B-NR	1. In patients with a BAV and a diameter of the aortic root, ascending aorta, or both of ≥5.5 cm, surgery to replace the aortic root, ascending aorta, or both is recommended.[1-3]
2a	B-NR	2. In patients with a BAV and a cross-sectional aortic root or ascending aortic area (cm^2) to height (m) ratio of ≥10 cm^2/m, surgery to replace the aortic root, ascending aorta, or both is reasonable, when performed by experienced surgeons in a Multidisciplinary Aortic Team.[3,4]
2a	B-NR	3. In patients with a BAV, a diameter of the aortic root or ascending aorta of 5.0 cm to 5.4 cm, and an additional risk factor for aortic dissection (Table 14), surgery to replace the aortic root, ascending aorta, or both is reasonable, when performed by experienced surgeons in a Multidisciplinary Aortic Team.[1,5]
2a	B-NR	4. In patients with a BAV who are undergoing surgical aortic valve repair or replacement, and who have a diameter of the aortic root or ascending aorta of ≥4.5 cm, concomitant replacement of the aortic root, ascending aorta, or both is reasonable, when performed by experienced surgeons in a Multidisciplinary Aortic Team.[1,6]
2b	B-NR	5. In patients with a BAV, a diameter of the aortic root or ascending aorta of 5.0 cm to 5.4 cm, no other risk factors for aortic dissection (Table 14), and at low surgical risk, surgery to replace the aortic root, ascending aorta, or both may be reasonable, when performed by experienced surgeons in a Multidisciplinary Aortic Team.[1,2,5]

Table 14. Risk Factors for Aortic Dissection

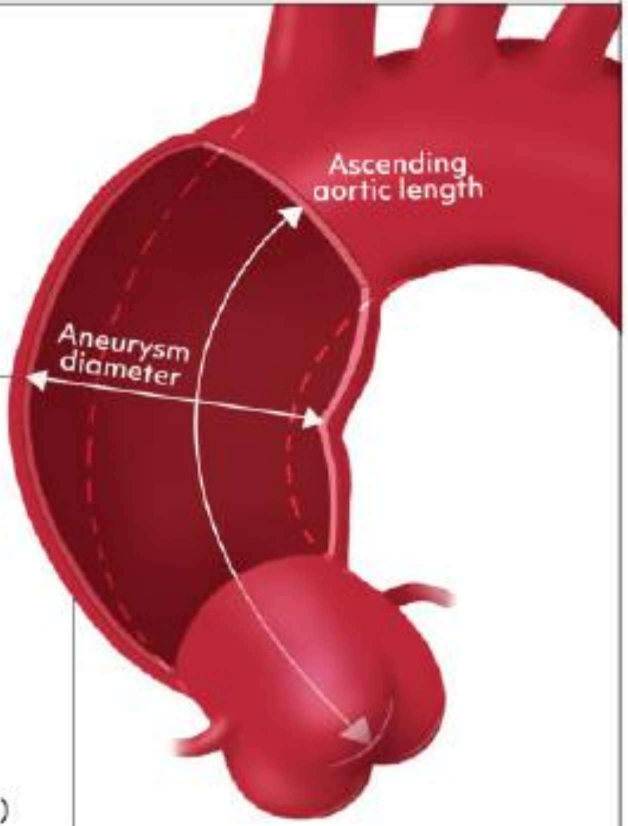
Family history of aortic dissection
Aortic growth rate ≥0.3 cm/y
Aortic coarctation
"Root phenotype" aortopathy

Petite taille: SAo /Taille: >10 cm^2/m

Thresholds for intervention in aortic root and ascending aortic aneurysm

Tricuspid aortic valve (TAV)

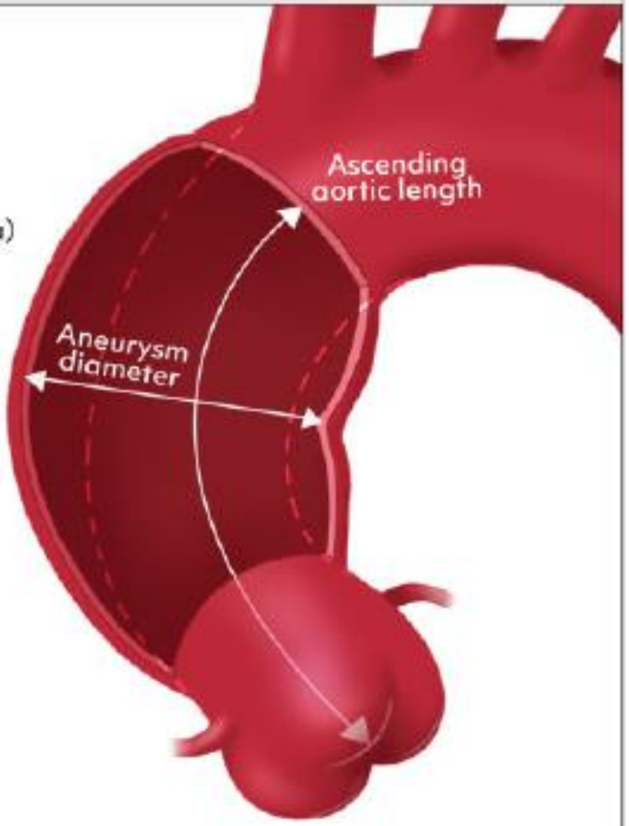
Thresholds ascending phenotype:
- ≥55mm (I)
- >52mm (IIa)
- ≥50mm in low-risk patients with RF* (IIb)
- ≥45mm when undergoing AV surgery (IIa)



Thresholds root phenotype:
- ≥55mm (I)
- ≥50mm in low-risk patients (IIa)
- ≥45mm when undergoing AV surgery (IIa)

Bicuspid aortic valve (BAV)

Thresholds ascending phenotype:
- ≥55mm (I)
- >52mm (IIa)
- ≥50mm in low-risk patients with RF (IIa)
- ≥45mm when undergoing AV surgery (IIa)

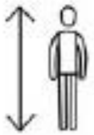


Thresholds root phenotype:
- ≥50mm (I)
- ≥45mm when undergoing AV surgery (IIa)

*Risk factors (RF)


Length of ascending aorta ≥11cm


>3mm diameter increase per year


Height <1.69m


Age <50 years old

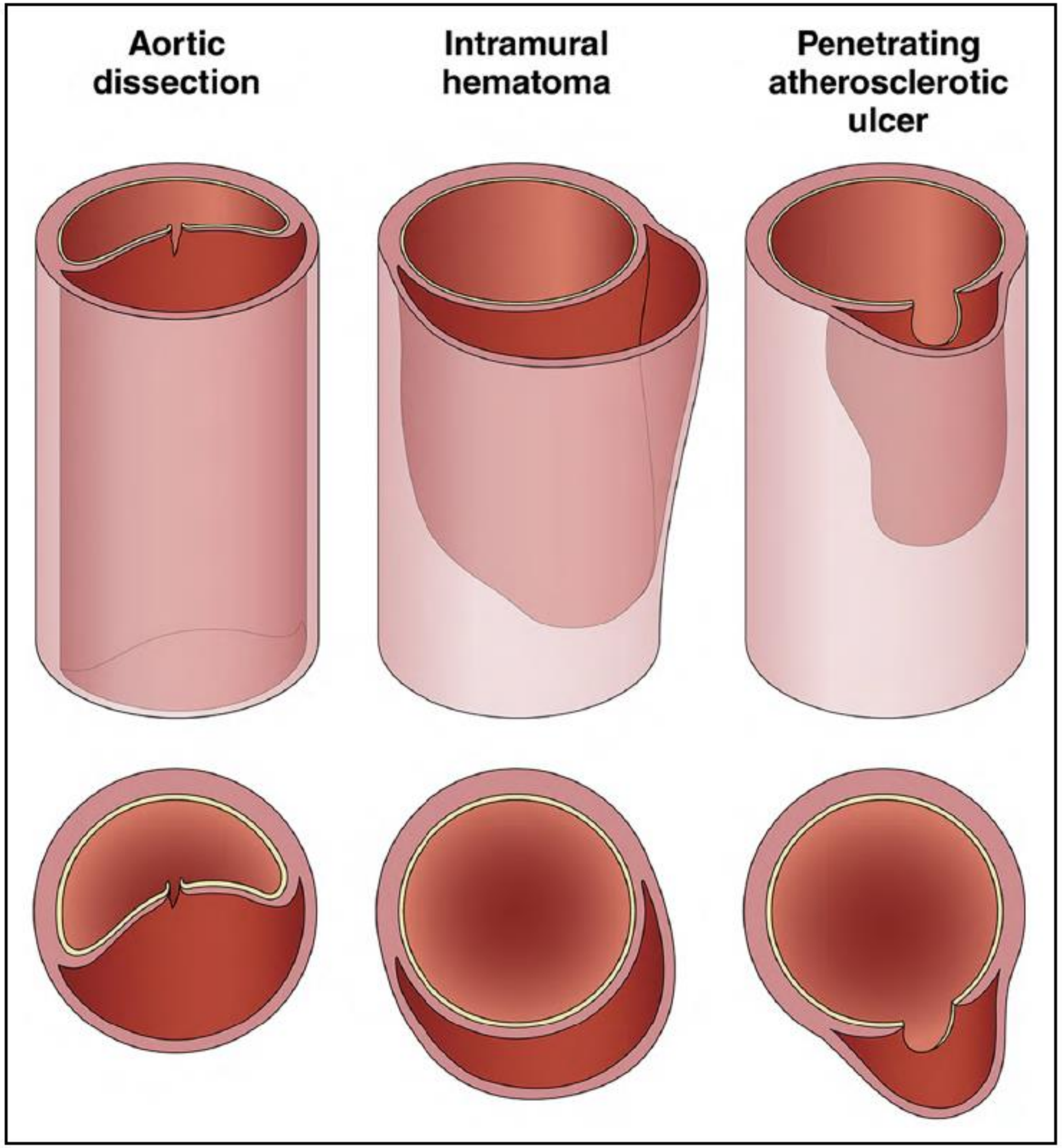

Arterial hypertension

Aortic root

Recommendation Table 22: Therapeutic options: aortic root

Recommendations	Class[a]	Level[b]	Ref[c]
For aortic dilatations and aneurysms involving the aortic root with a structurally diseased aortic valve, replacement of the aortic valve and sinuses with coronary ostia direct reimplantation (modified Bentall operation) is recommended.	I	B	[559–561]
Valve-sparing root replacement should be considered for patients with a non-diseased tricuspid aortic valve and dilated root, especially young patients, if performed by experienced surgeons.	IIa	B	[562, 563]
Valve-sparing root replacement may be considered for patients with a non-diseased bicuspid aortic valve and dilated root if performed by surgeons with specific expertise in aortic valve repair.	IIb	B	[564]

Les syndromes aortiques aigus


Aortic dissection
Intramural hematoma
Penetrating atherosclerotic ulcer

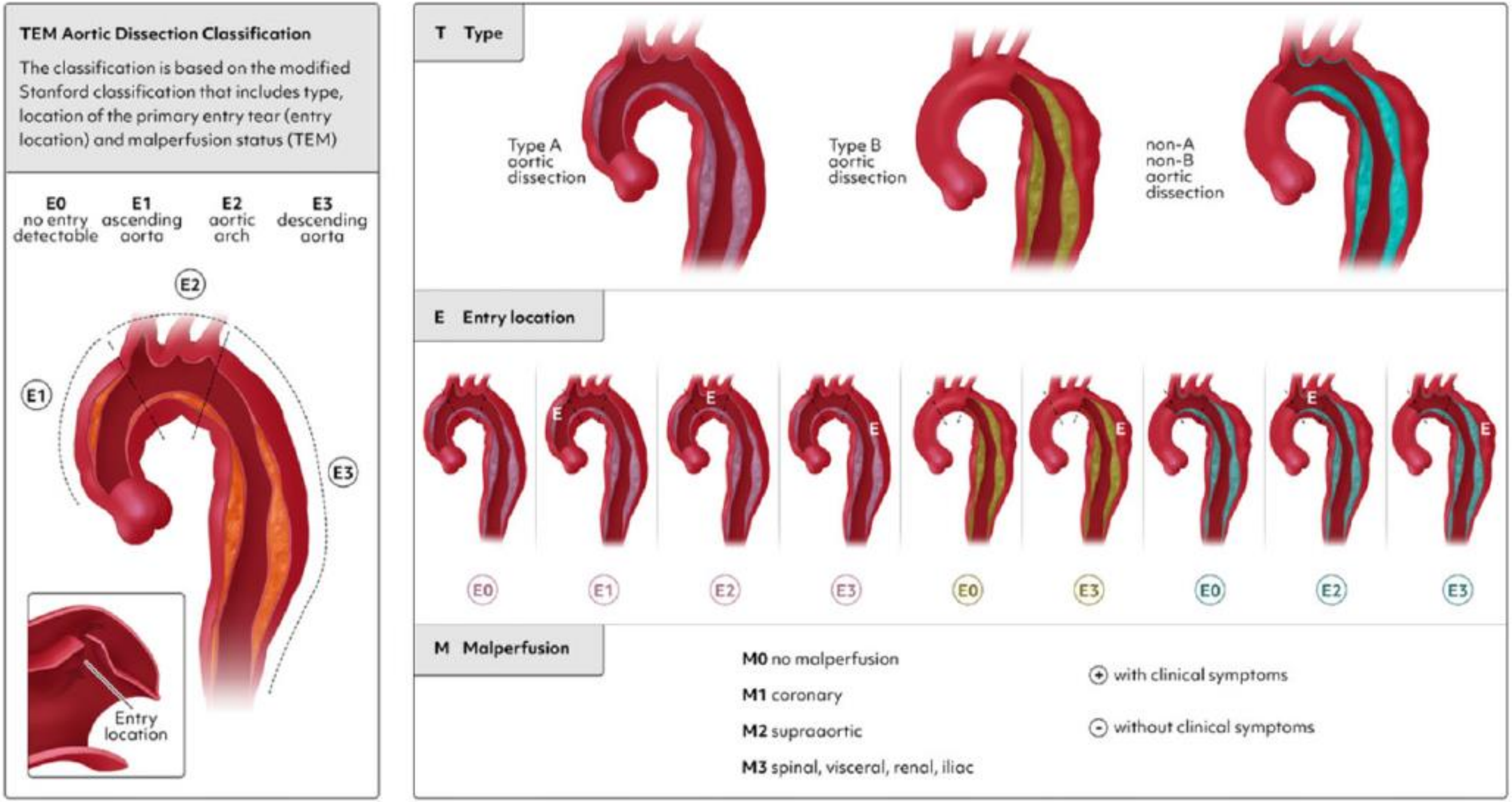


Figure 6: Type, entry, malperfusion classification for acute aortic dissection. TEM: type, entry, malperfusion.

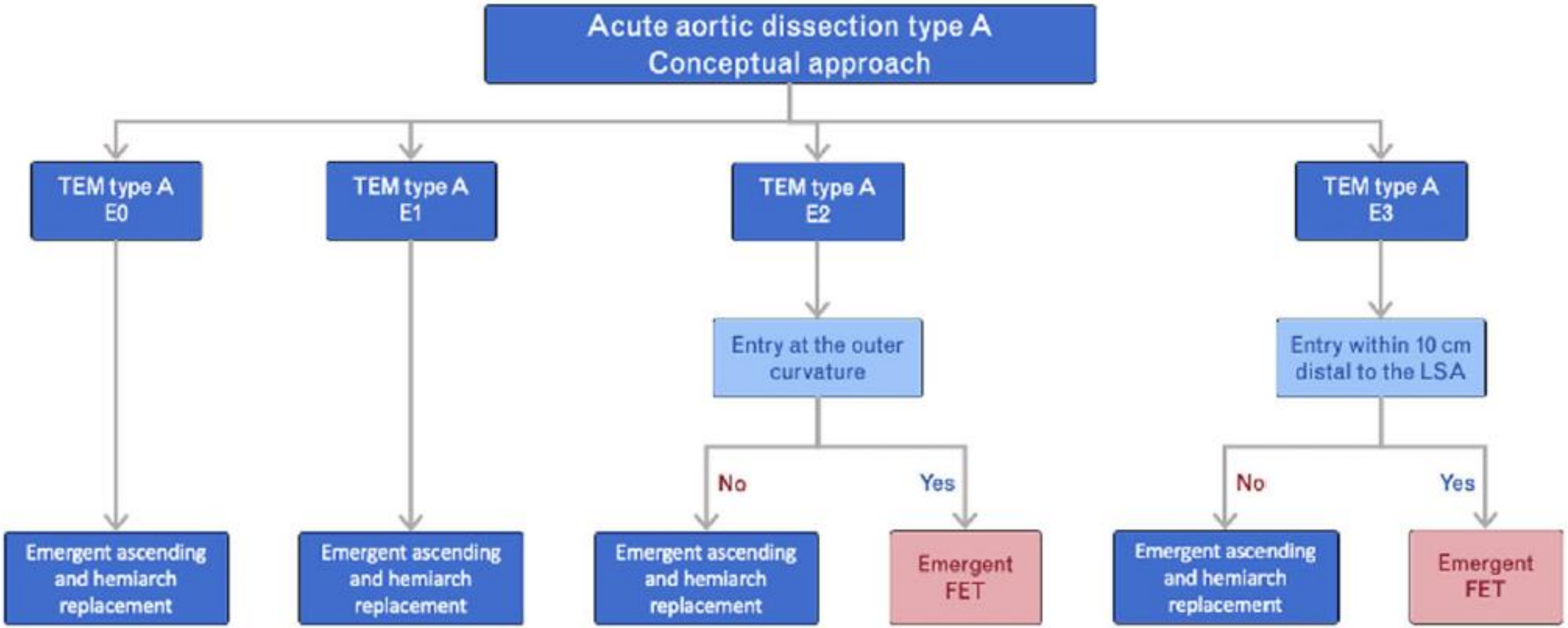


Figure 11: Extent of treatment for acute type A aortic dissection. E0, no entry visible; E1, ascending entry; E2, arch entry; E3 descending entry; FET: frozen elephant trunk; LSA: left subclavian artery; TEM: type, entry, malperfusion.

Type A intramural haematoma.

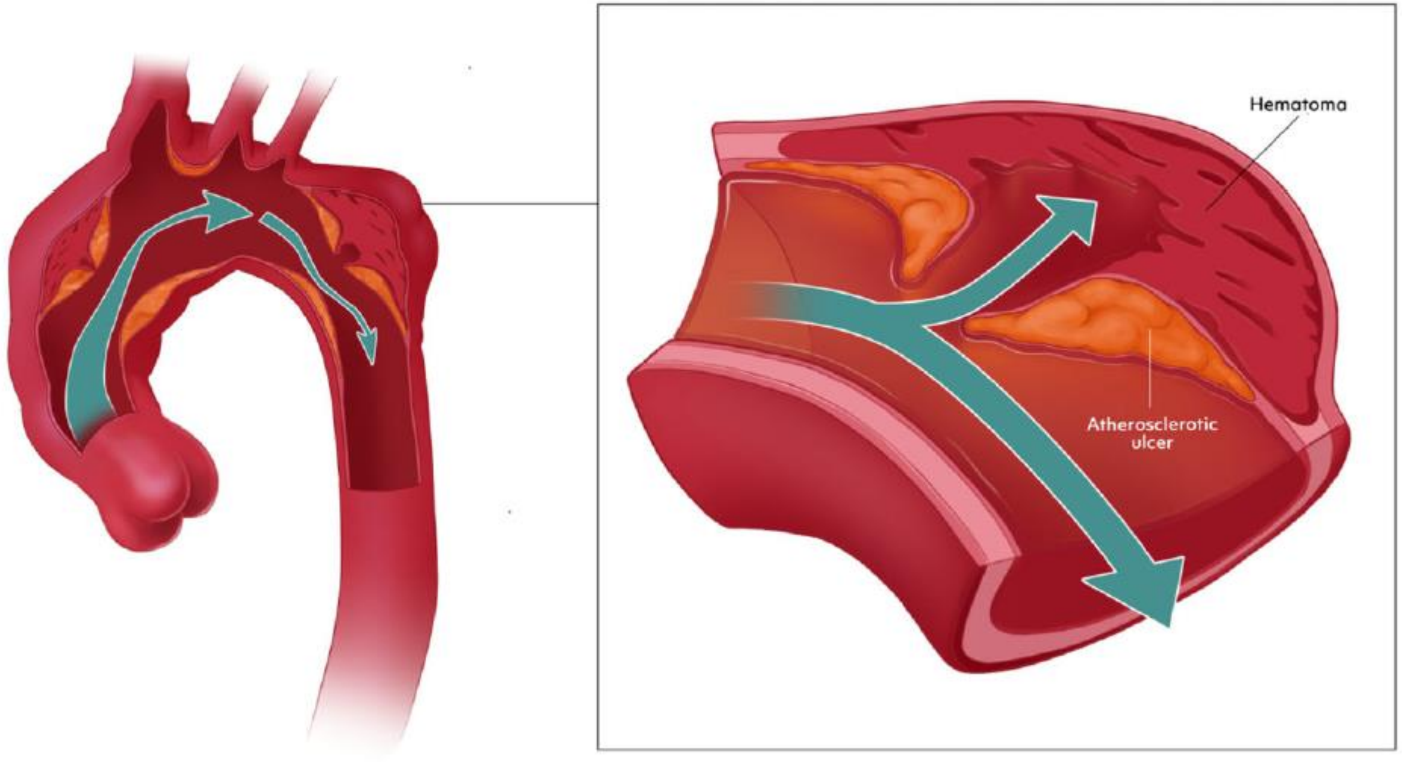
Recommendation Table 8: Acute aortic diseases: type A intramural haematoma

Recommendations	Class[a]	Level[b]	Ref[c]
In patients with acute type A IMH with complications or high-risk features, emergency surgery is recommended.	I	B	[283, 287–290]
Optimal medical therapies and serial imaging may be considered in patients with type A IMH in the absence of high-risk features.	IIb	C	-
In selected patients with acute type A IMH without high-risk features but a tear in the descending aorta, TEVAR may be considered in addition to OMT in specialized centres.	IIb	C	-

Table 4: High-risk features in intramural haematomas

Age >70 years [293, 294]
Initial aortic diameter >45 mm [293, 295]
Mean aortic diameter growth rate ≥5 mm/year [296]
Wall thickness of involved segment ≥10 mm [297]
Pleural effusion based on Hounsfield units [298, 299]
Presence of aortic ulcer or ulcer-like projection [294, 300]

Penetrating Atherosclerotic Ulcer (PAU)

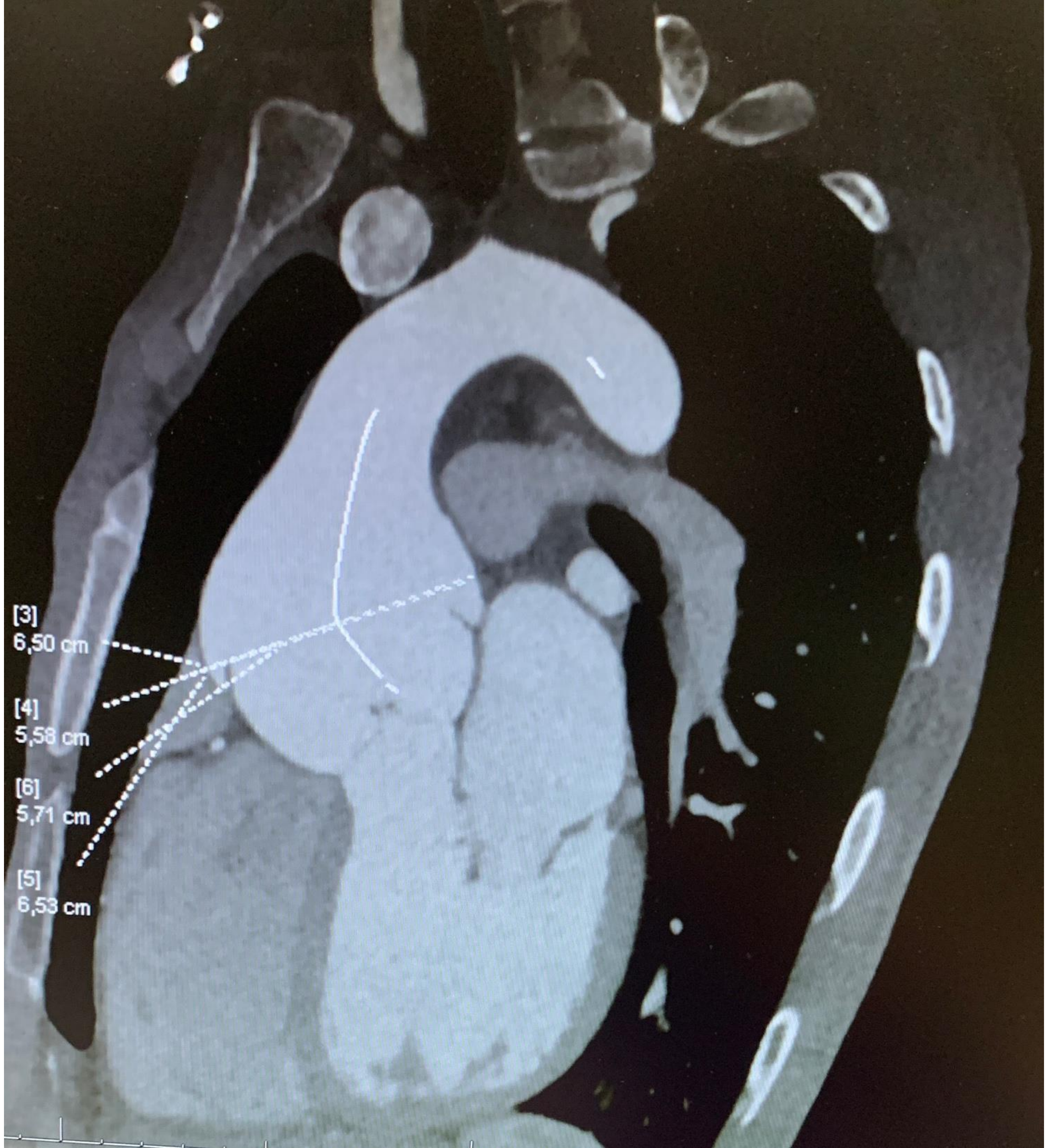


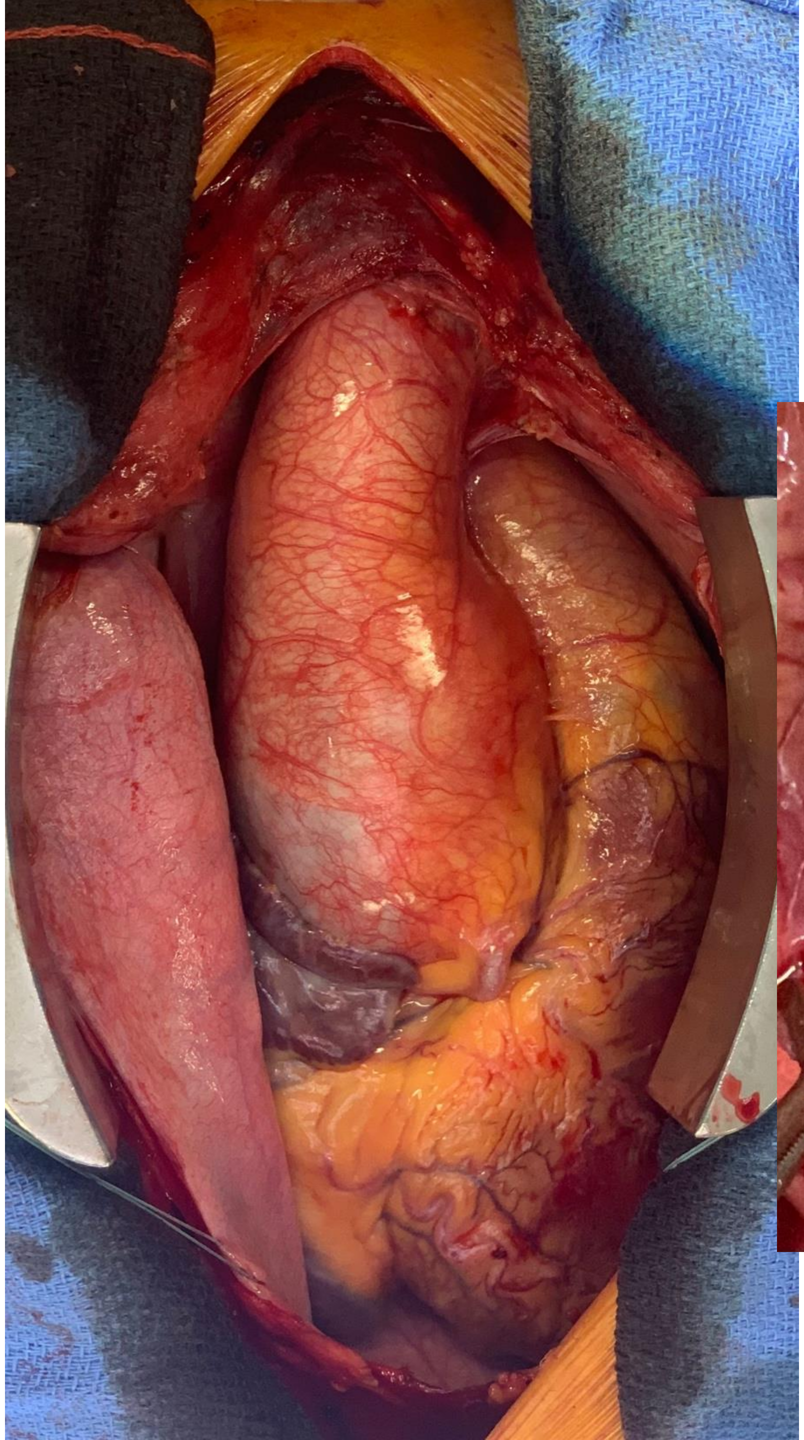
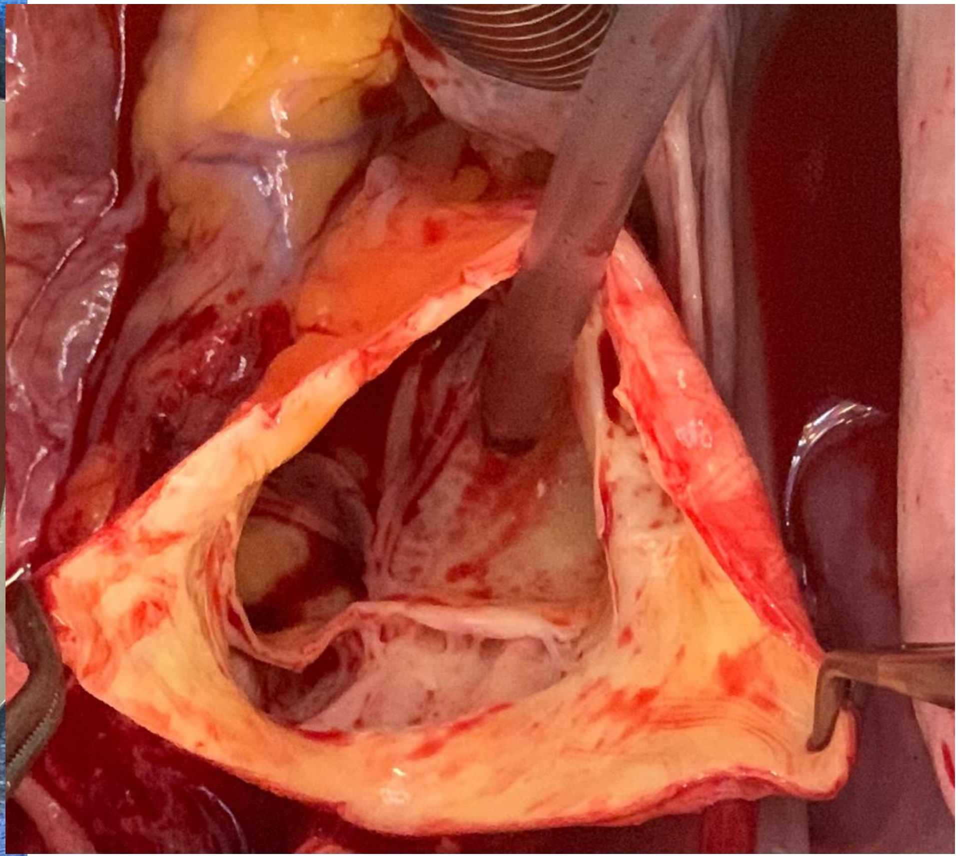
Penetrating atherosclerotic ulcer.

Recommendation Table 10: Acute aortic diseases: penetrating atherosclerotic ulcer

Recommendations	Class[a]	Level[b]	Ref[c]
In patients with PAUs in the ascending aorta and the presence of IMH or rupture, urgent aortic repair is recommended.	I	B	[289]
In patients with high-risk PAUs located in the distal arch or descending aorta, TEVAR should be considered if anatomically suitable.	IIa	B	[310]
In patients with high-risk PAUs located in the distal arch or descending aorta unsuitable for TEVAR, open surgical repair should be considered after careful evaluation of operative risk.	IIa	B	[311]

Marfan, Loyes-Dietz, Turner……


[3]
6,50 cm
[4]
5,58 cm
[6]
5,71 cm
[5]
6,53 cm

Marfan Syndrome

Recommendations for Marfan Syndrome Interventions: Replacement of the Aortic Root in Patients With Marfan Syndrome Referenced studies that support the recommendations are summarized in the Online Data Supplement.		
COR	**LOE**	**Recommendations**
1	**B-NR**	1. In patients with Marfan syndrome and an aortic root diameter of ≥5.0 cm, surgery to replace the aortic root and ascending aorta is recommended.[1-4]
2a	**B-NR**	2. In patients with Marfan syndrome, an aortic root diameter of ≥4.5 cm, and features associated with an increased risk of aortic dissection (see Table 10), surgery to replace the aortic root and ascending aorta is reasonable, when performed by experienced surgeons in a Multidisciplinary Aortic Team.[1,3,4]
2a	**C-LD**	3. In patients with Marfan syndrome and a maximal cross-sectional aortic root area (cm2) to patient height (m) ratio of ≥10, surgery to replace the aortic root and ascending aorta is reasonable, when performed by experienced surgeons in a Multidisciplinary Aortic Team.[5]
2b	**C-LD**	4. In patients with Marfan syndrome and an aortic diameter approaching surgical threshold, who are candidates for valve-sparing root replacement (VSRR) and have a very low surgical risk, surgery to replace the aortic root and ascending aorta may be reasonable when performed by experienced surgeons in a Multidisciplinary Aortic Team.[2-4]

Table 10. Features Associated With Increased Risk of Aortic Complications in Marfan Syndrome

Family history of aortic dissection
Rapid aortic growth (≥0.3 cm/y)
Diffuse aortic root and ascending aortic dilation[14]
Marked vertebral arterial tortuosity[15]

Recommendation Table 16: Heritable thoracic aortic disease

Recommendations	Class[a]	Level[b]	Ref[c]
Genetic testing is recommended in patients with thoracic aortic disease <60 years of age, family history of TAD, arterial aneurysms in other segments and those with syndromic features.	I	B	[169, 372, 373]
Testing of family members is recommended by simpler, more cost-efficient Sanger sequencing of only the suspect genetic area.	I	C	-
Marfan syndrome			
In patients with Marfan syndrome, surgery on the aortic root or ascending aorta is recommended at a diameter of ≥50 mm.	I	B	[374, 375]
In patients with Marfan syndrome and high-risk features,* surgery on the aortic root or ascending aorta should be considered at a diameter of ≥45 mm.	IIa	B	[374, 375]
In patients with Marfan syndrome without high-risk features with a high likelihood of undergoing valve-sparing aortic root replacement and very low surgical risk, surgery on the aortic root or ascending aorta may be considered at a diameter of ≥45 mm when performed by an experienced aortic team.	IIb	C	-
In patients with Marfan syndrome, surgery of the aortic arch, descending thoracic aorta or abdominal aorta should be considered at a diameter of ≥50 mm of the respective aortic segment.	IIa	C	-
Loeys–Dietz syndrome			
In patients with Loeys–Dietz syndrome, indication for surgery is recommended based on the specific genetic variant, aortic diameter, aortic growth rate, family history, history of aortic events, patient age and other individual patient-related factors and discussed by a multidisciplinary aortic team.	I	C	-
In patients with Loeys–Dietz syndrome attributable to a pathogenic variant in TGFBR1 or TGFBR2, surgery on the aortic root or ascending aorta is recommended at a diameter of ≥45 mm.	I	C	-
In patients with Loeys–Dietz syndrome attributable to a pathogenic variant in TGFBR1 and high-risk features,* surgery on the aortic root or ascending aorta may be considered at a diameter of ≥40 mm.	IIb	C	-
In patients with Loeys–Dietz syndrome attributable to a pathogenic variant in TGFBR2 and high-risk features,# surgery on the aortic root or ascending aorta should be considered at a diameter of ≥40 mm.	IIa	C	-
In patients with Loeys–Dietz syndrome attributable to a pathogenic variant in TGFB3, surgery on the aortic root or ascending aorta may be considered at a diameter of ≥50 mm.	IIb	C	-
In patients with Loeys–Dietz syndrome attributable to a pathogenic variant in SMAD3, surgery on the aortic root or ascending aorta should be considered at a diameter of ≥45 mm.	IIa	C	-
In patients with Loeys–Dietz syndrome attributable to a pathogenic variant in TGFBR1, TGFBR2 or SMAD3, surgery to replace the intact arch, descending aorta or abdominal aorta at a diameter of ≥45 mm may be considered.	IIb	C	-
In patients with Loeys–Dietz syndrome attributable to a pathogenic variant in SMAD2 or TGFB2, surgery on the aortic root or ascending aorta may be considered at a diameter of ≥45 mm.	IIb	C	-

Table 13. Surgical Thresholds for Prophylactic Aortic Root and Ascending Aortic Replacement in Nonsyndromic Heritable Thoracic Aortic Disease Based on the Genetic Variant and Additional Risk Factors for Aortic Dissection

COR*	LOE*	Genetic Variant	Risk Factors	Aortic Diameter (cm)
2a	C-LD	*ACTA2*	No	≥4.5
2b	C-EO	*ACTA2*	Yes†	≥4.2
2b	C-LD	*PRKG1*	No	≥4.2
2b	C-EO	*PRKG1*	Yes†	≥4.0†

*Patient has risk factors for aortic dissection (family history of type A aortic dissection with minimal aortic enlargement, aortic growth rate ≥0.3 cm/y) or significant valve disease requiring surgery.

†Earlier surgery may be considered in patients with a family history of type A aortic dissection in the setting of no or minimal aortic dilation, aortic growth rate ≥0.3 cm/y, or at the patient's request.

Colors correspond to COR and LOE in Table 2.

COR indicates class of recommendation; and LOE, level of evidence.

Turner

Recommendations for Diagnostic Testing, Surveillance, and Surgical Intervention for Aortic Dilation in Turner Syndrome (Continued)		
COR	LOE	Recommendations
1	C-EO	5. In patients with Turner syndrome and risk factors for aortic dissection (Table 12), surveillance aortic imaging at an interval depending on the aortic diameter, ASI, and aortic growth rate is recommended (Figure 18).[9]
2a	C-LD	6. In patients with Turnery syndrome who are ≥15 years old and have an ASI of ≥2.5 cm/m^2 plus risk factors for aortic dissection (Table 12), surgical intervention to replace the aortic root, ascending aorta, or both is reasonable.[9,10]
2b	C-EO	In those without risk factors for aortic dissection, surgical intervention to replace the aortic root, ascending aorta, or both may be considered.

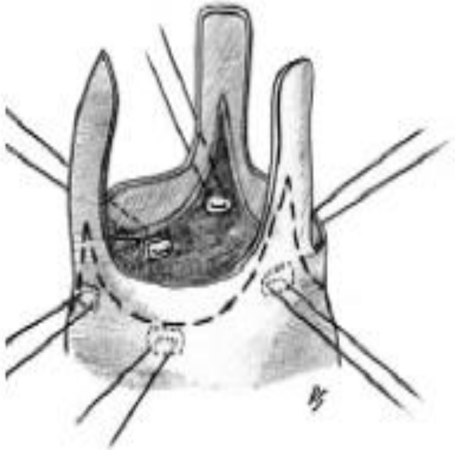
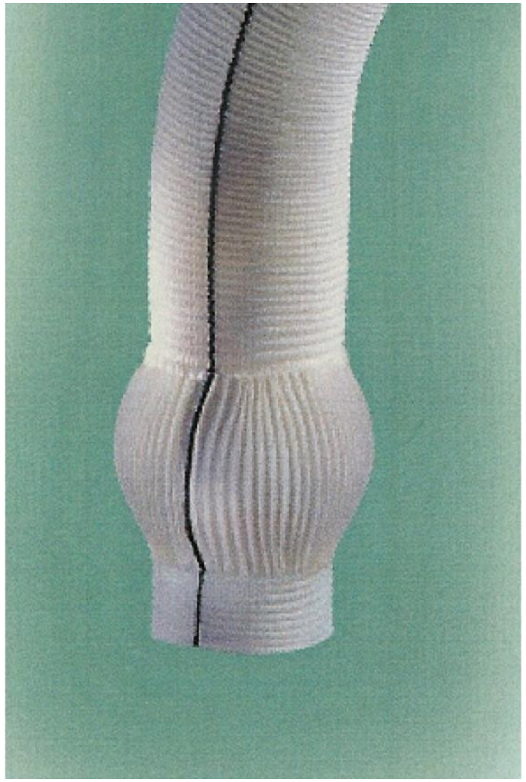
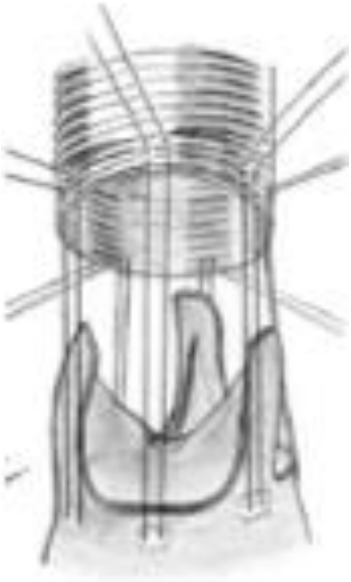
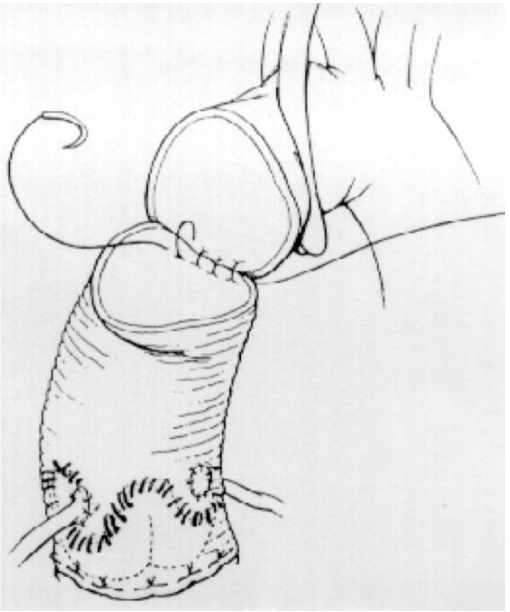
Table 12. Risk Factors for Aortic Dissection in Patients With Turner Syndrome

Aortic coarctation
Aortic dilation
Bicuspid aortic valve
Hypertension

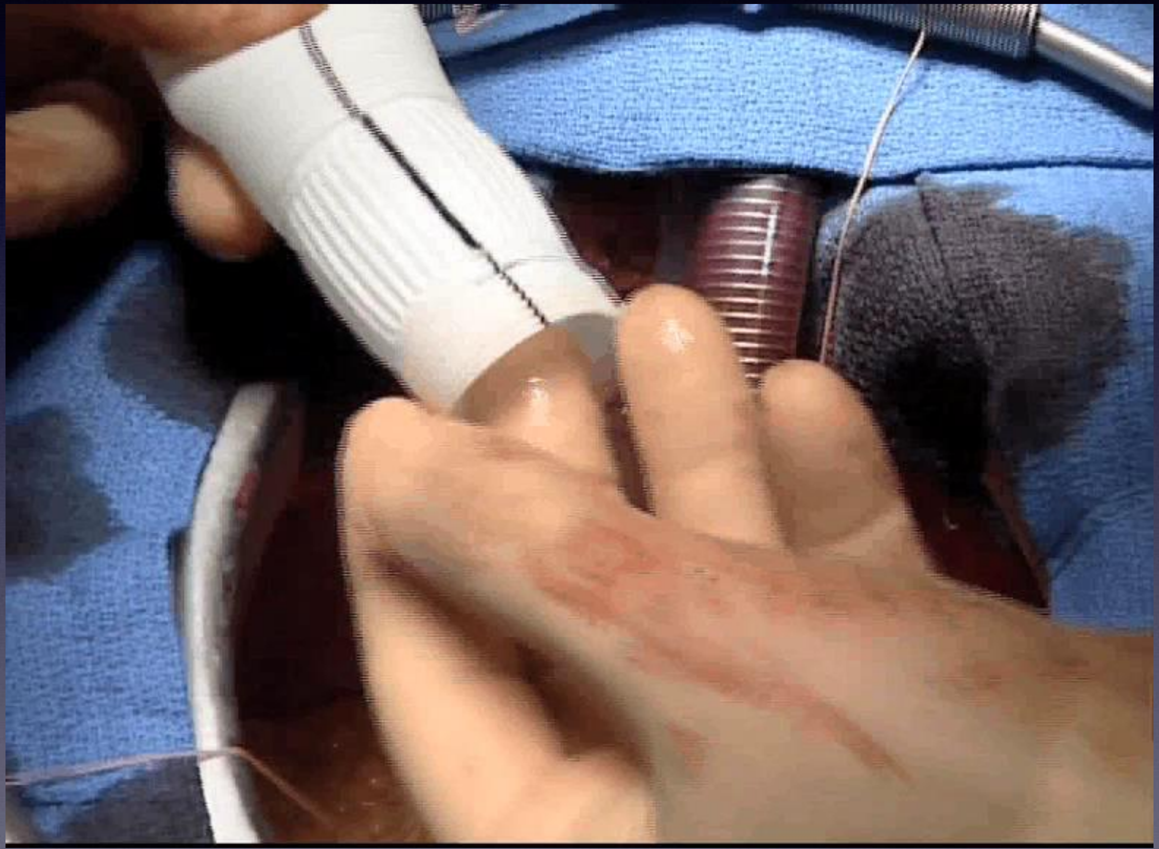
ASI= max aortic diam (cm)/BSA

Quelle Chirurgie ?

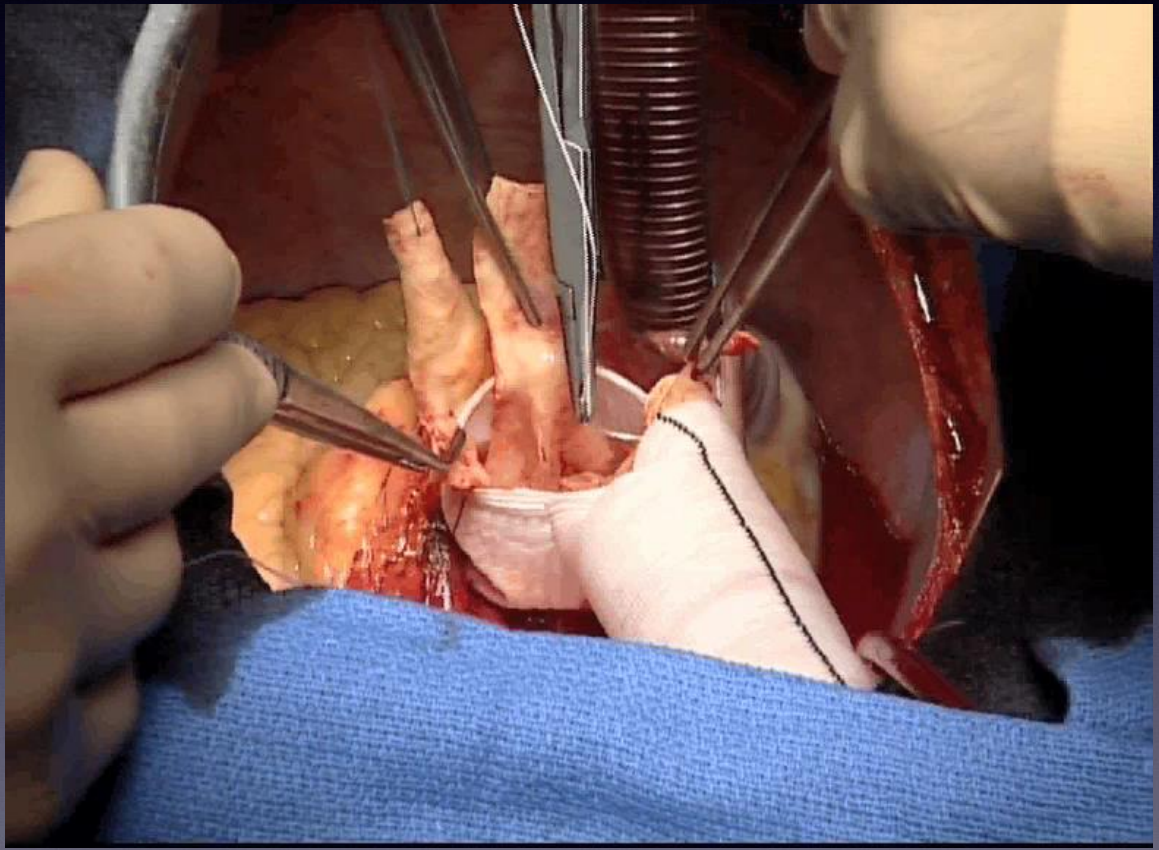
Chirurgie Conservatrice

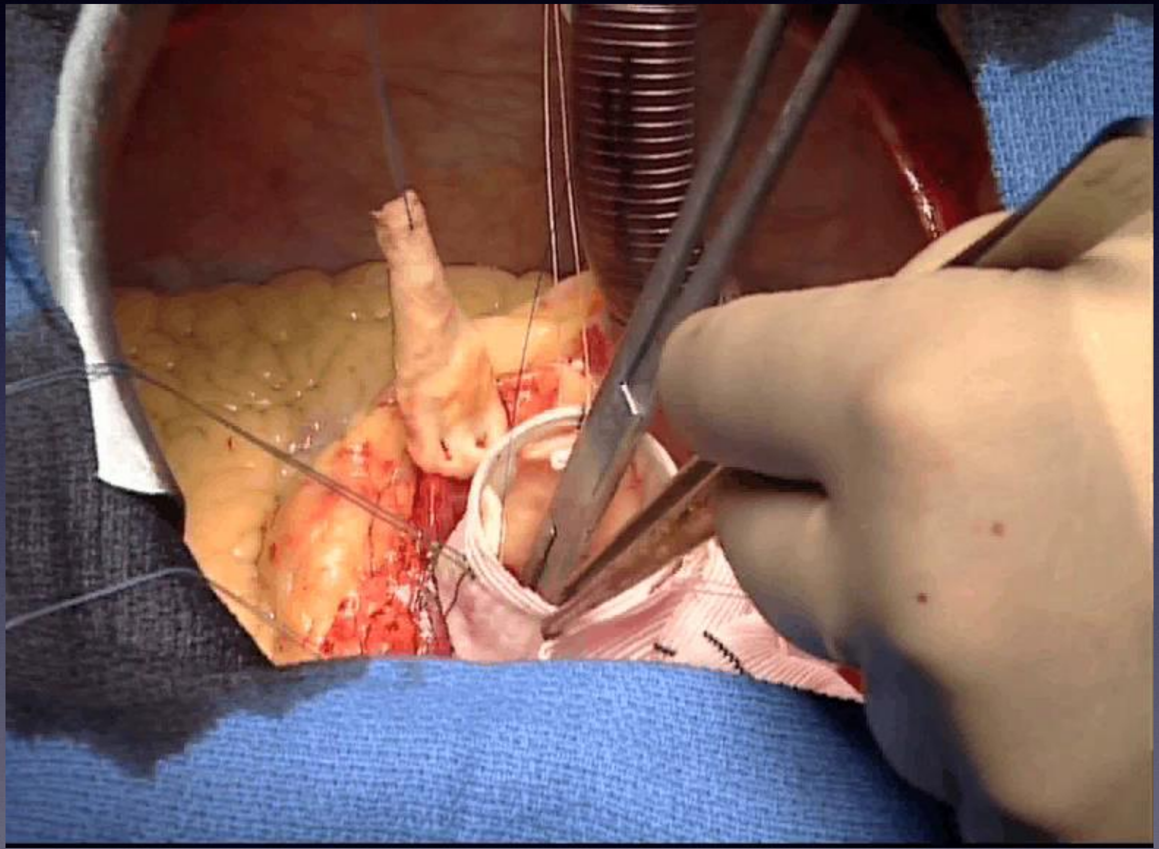
Inclusion de l’anneau



Ré-implantation (1)



Ré-implantation (2)



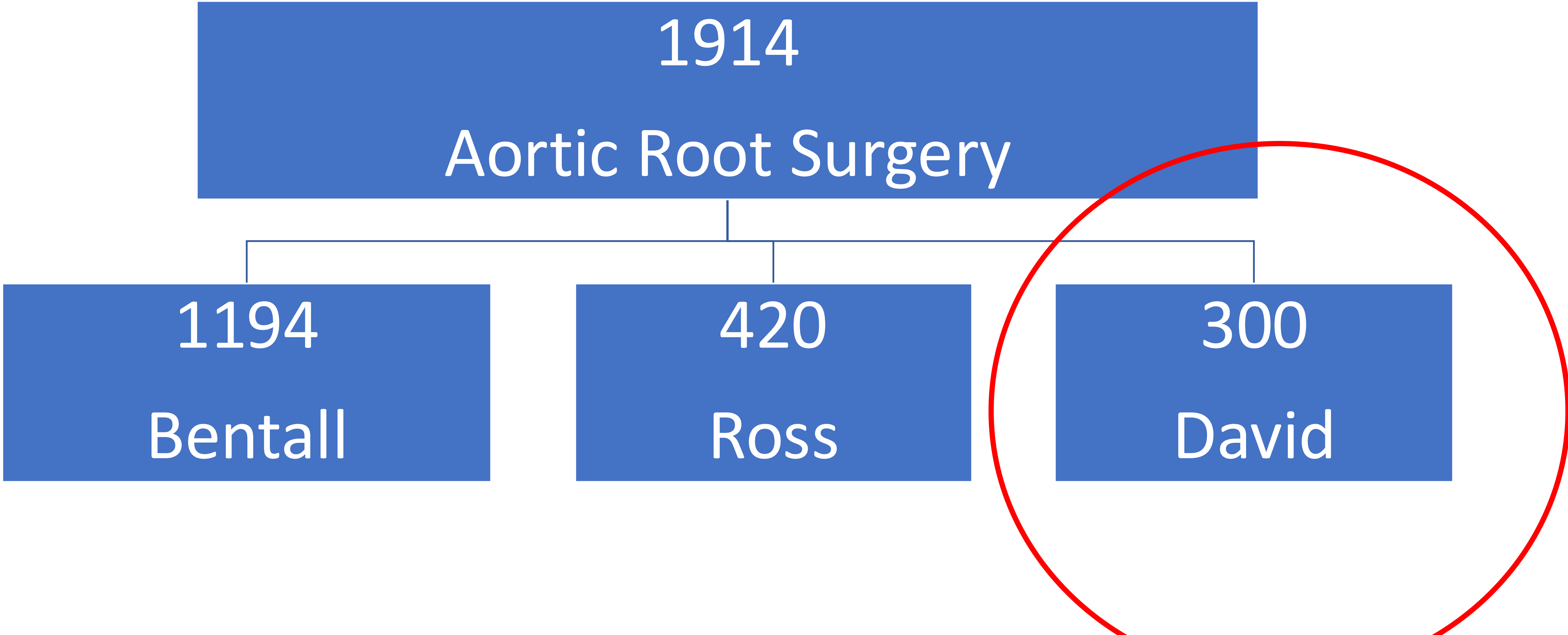
ETO perop


Centre Hospitalier de
Cardiaque TIs:2.0
25/10/06
0:51:31PA MPTE 5 MHz MI:0.8
11:13

Résultats à long terme de l'intervention de Tirone David

Expérience Lilloise

January 1998-August 2019



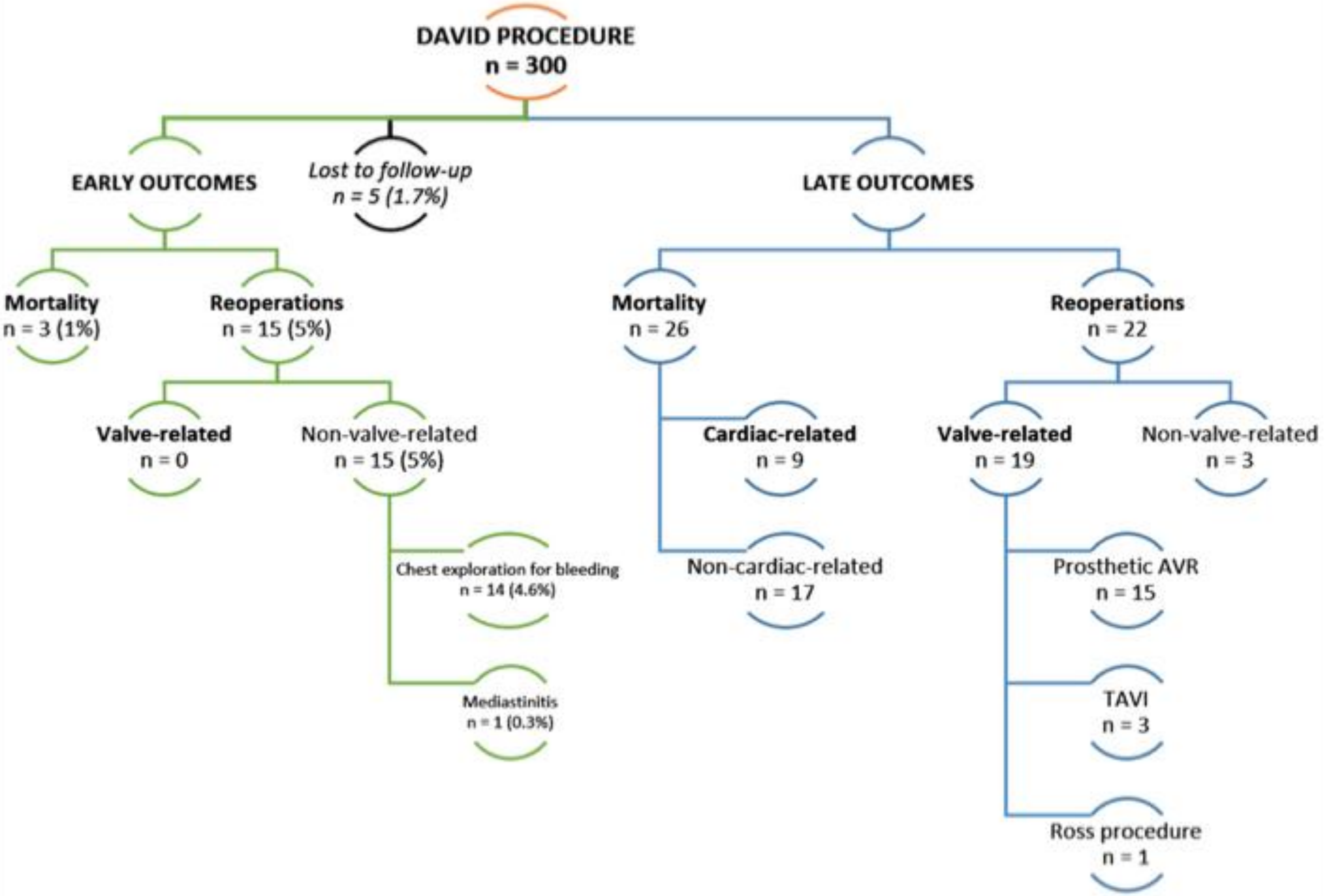
- **Median age : 53 (11-80)**
- **70% men**
- **Asymptomatic : 191 (64%)**
- **NYHA III & IV: 11 (3.6%)**
- **Aortic Regurgitation ≥ grade 2 : 159 (53%)**
- **Median Aorta Diameter (mm) : 52 (40-82)**

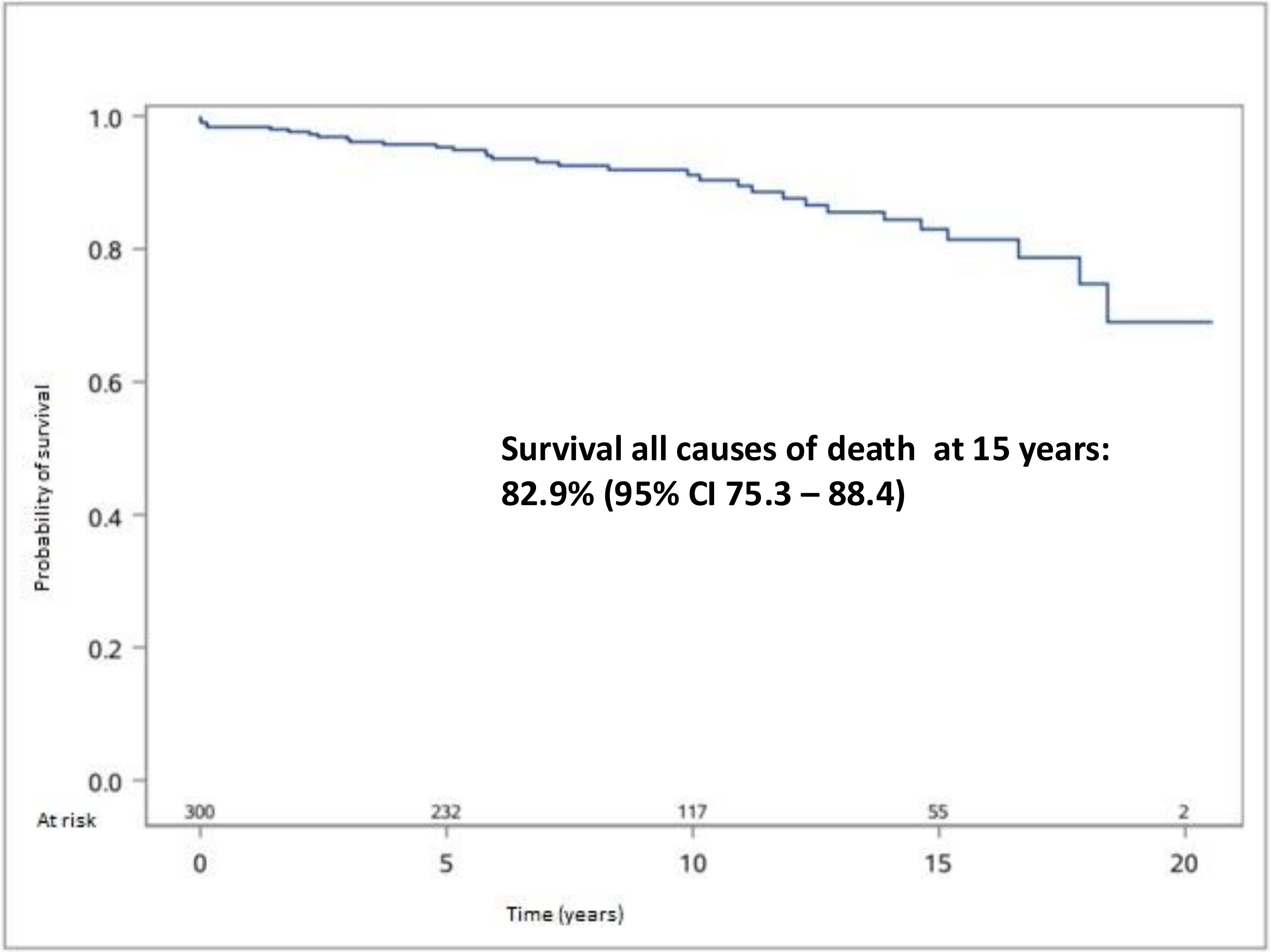
- **Bicuspid valve:** **57 (19%)**
- **Marfan:** **18 (6%)**
- **Acute type A dissection :** **10 (3.3%)**
- **Redo (Ross):** **7 (2,8%)**
- **Chronic dissection:** **2 (0,8%)**

Results

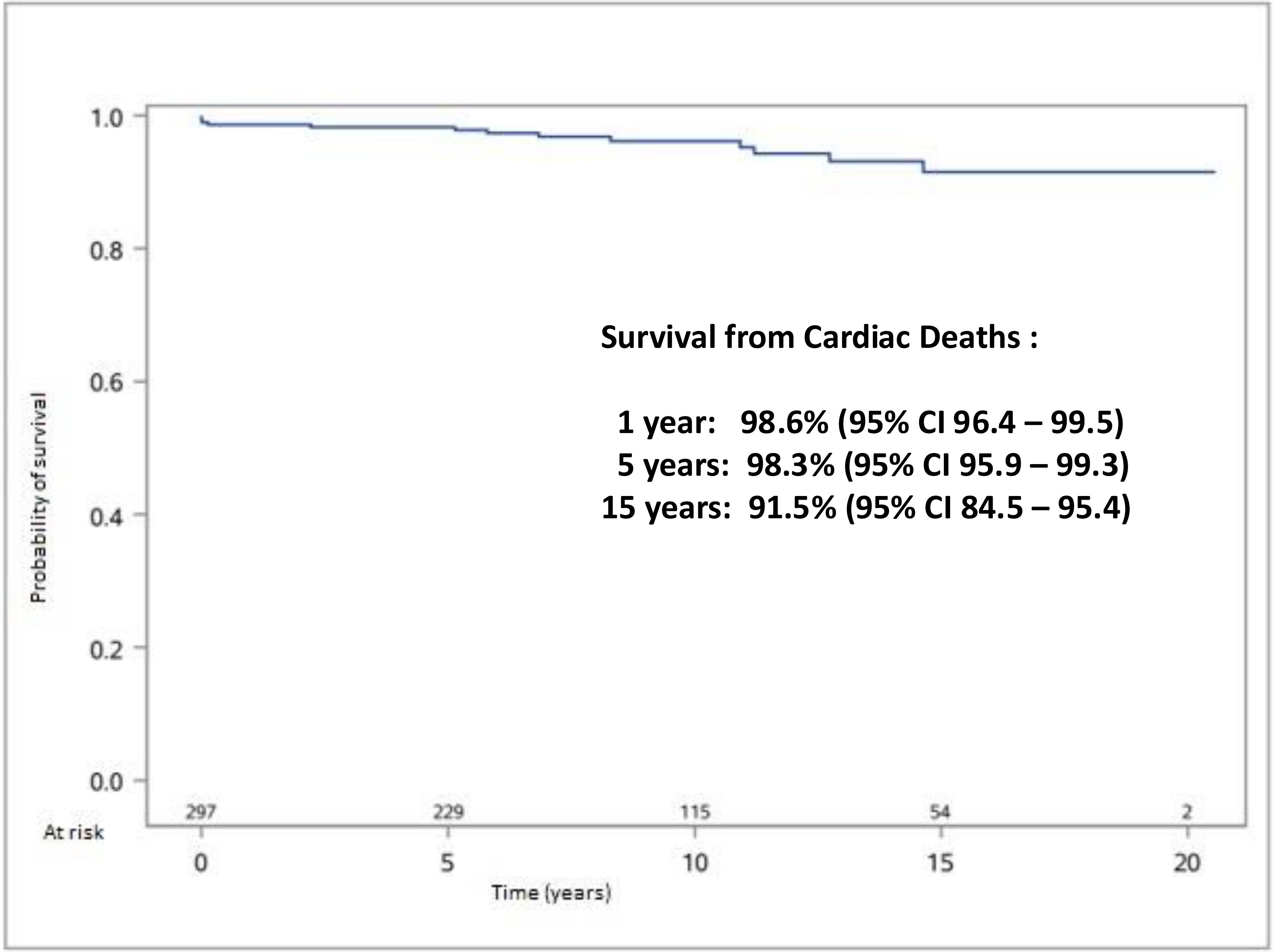
- **Tricuspid aortic valve repair n=243**
  - **Free margin plication 4 %**
  - **Commisuroplasty 5%**
  - **Pericardial patch 0.4%**
- **Bicuspid aortic valve repair n=57**
  - **Free margin plication 12%**
  - **Commisuroplasty 9%**
  - **Pericardial patch 2%**

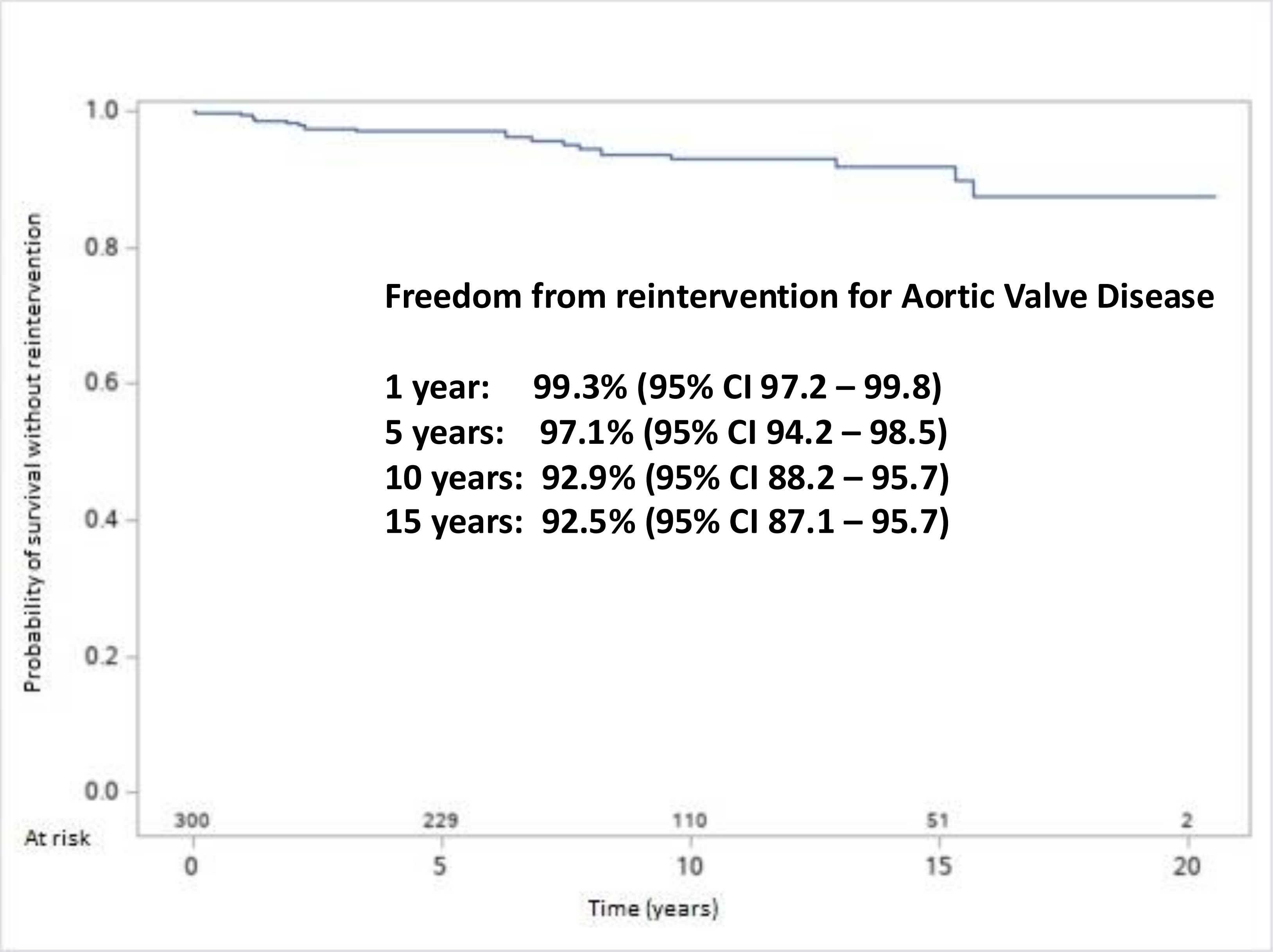
- **Median time follow up (years)** **7.1 (4.1-11.5/max 19.5)**
- **Lost for follow up** **5 (1.7%)**

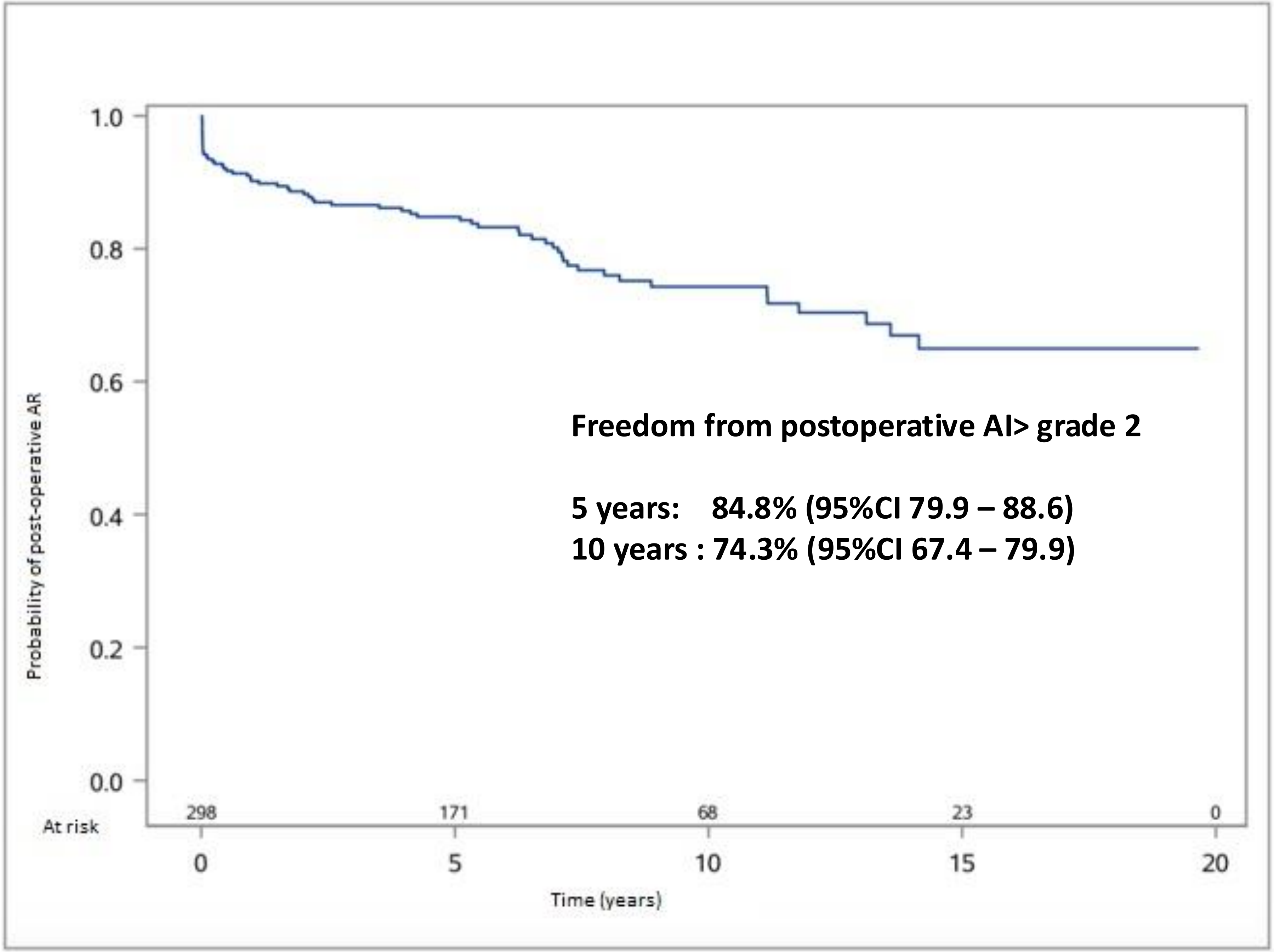

DAVID PROCEDURE
n = 300
EARLY OUTCOMES
Lost to follow-up
n = 5 (1.7%)
LATE OUTCOMES
Mortality
n = 3 (1%)
Reoperations
n = 15 (5%)
Mortality
n = 26
Reoperations
n = 22
Valve-related
n = 0
Non-valve-related
n = 15 (5%)
Cardiac-related
n = 9
Valve-related
n = 19
Non-valve-related
n = 3
Chest exploration for bleeding
n = 14 (4.6%)
Non-cardiac-related
n = 17
Prosthetic AVR
n = 15
Mediastinitis
n = 1 (0.3%)
TAVI
n = 3
Ross procedure
n = 1



1.0
0.8
0.6
0.4
0.2
0.0
Probability of survival
At risk
300
232
117
55
2
0
5
10
15
20
Time (years)
Survival all causes of death at 15 years:
82.9% (95% CI 75.3 – 88.4)


1.0
0.8
0.6
0.4
0.2
0.0
Probability of survival
Survival from Cardiac Deaths :
1 year: 98.6% (95% CI 96.4 – 99.5)
5 years: 98.3% (95% CI 95.9 – 99.3)
15 years: 91.5% (95% CI 84.5 – 95.4)
At risk
297
229
115
54
2
0
5
10
15
20
Time (years)


Freedom from reintervention for Aortic Valve Disease
1 year: 99.3% (95% CI 97.2 – 99.8)
5 years: 97.1% (95% CI 94.2 – 98.5)
10 years: 92.9% (95% CI 88.2 – 95.7)
15 years: 92.5% (95% CI 87.1 – 95.7)
Probability of survival without reintervention
1.0
0.8
0.6
0.4
0.2
0.0
At risk
300
229
110
51
2
0
5
10
15
20
Time (years)


1.0
0.8
0.6
0.4
0.2
0.0
Probability of post-operative AR
Freedom from postoperative AI> grade 2
5 years: 84.8% (95%CI 79.9 – 88.6)
10 years : 74.3% (95%CI 67.4 – 79.9)
At risk
298
171
68
23
0
0
5
10
15
20
Time (years)

Risks factors for AR>2

Variable	HR	CI95%	p
Preoperative AR ≥ 2	1.782	[1.352-2.350]	0.0001
Ventriculo-aortic junction diameter ≥ 29 mm	3.379	[1.726-6.616]	0.0004

David procedure: a 21-year experience with 300 patients

Retrospective single center study

300 patients

Operated from 1998 to 2019

For aortic root aneurysm

Tricuspid aortic valve, n = 243

Bicuspid aortic valve, n = 57

DAVID PROCEDURE

Outcomes

1% early mortality

No early valve-related reoperation

19 late valve-related reinterventions

At 15 years:
Survival = **82.9%**
Freedom from valve-related reintervention = **92.5%**

Predictive factors associated with postoperative AI≥ 2

in multivariate analysis

Preoperative **AI≥ 2**
HR 1.782 [1.352-2.350]
P<0.001

Ventriculo-aortic junction diameter ≥ **29 mm**
HR 3.379 [1.726-6.616]
P<0.001

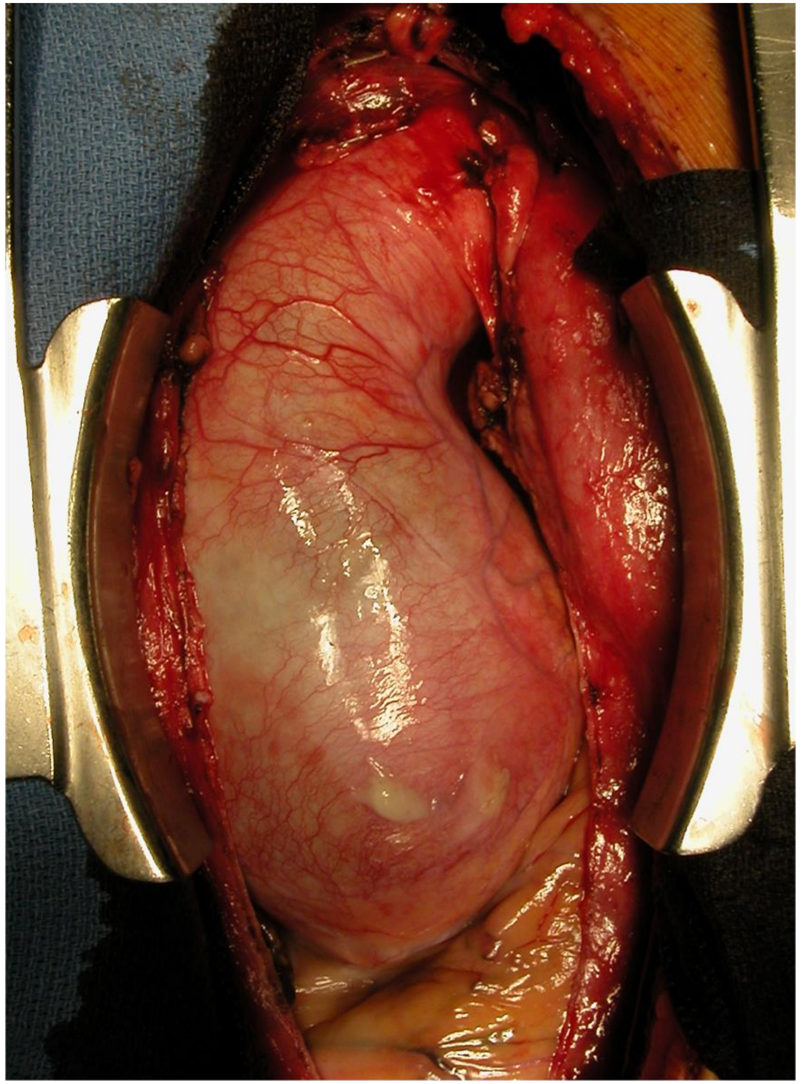
The David procedure provides excellent outcomes in selected patients

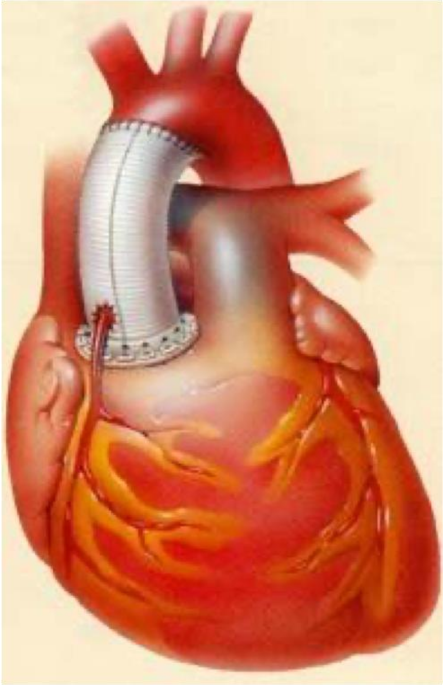
THE ANNALS OF THORACIC SURGERY
Official Journal of The Society of Thoracic Surgeons and the Southern Thoracic Surgical Association

Manganiello et al, 2021

@annalsthorsurg #TSSMN
#VisualAbstract #AnnalsImages

Il faut remplacer la valve aortique





Pourquoi l'intervention de Ross offre une survie postopératoire superposable à la population générale…et pas les autres techniques

Conflit d’intérêt

- Je propose toujours en premier choix l’intervention de Ross chez l’adulte jeune souffrant d’un rétrécissement aortique

Quelle survie après une chirurgie de la valve aortique ?

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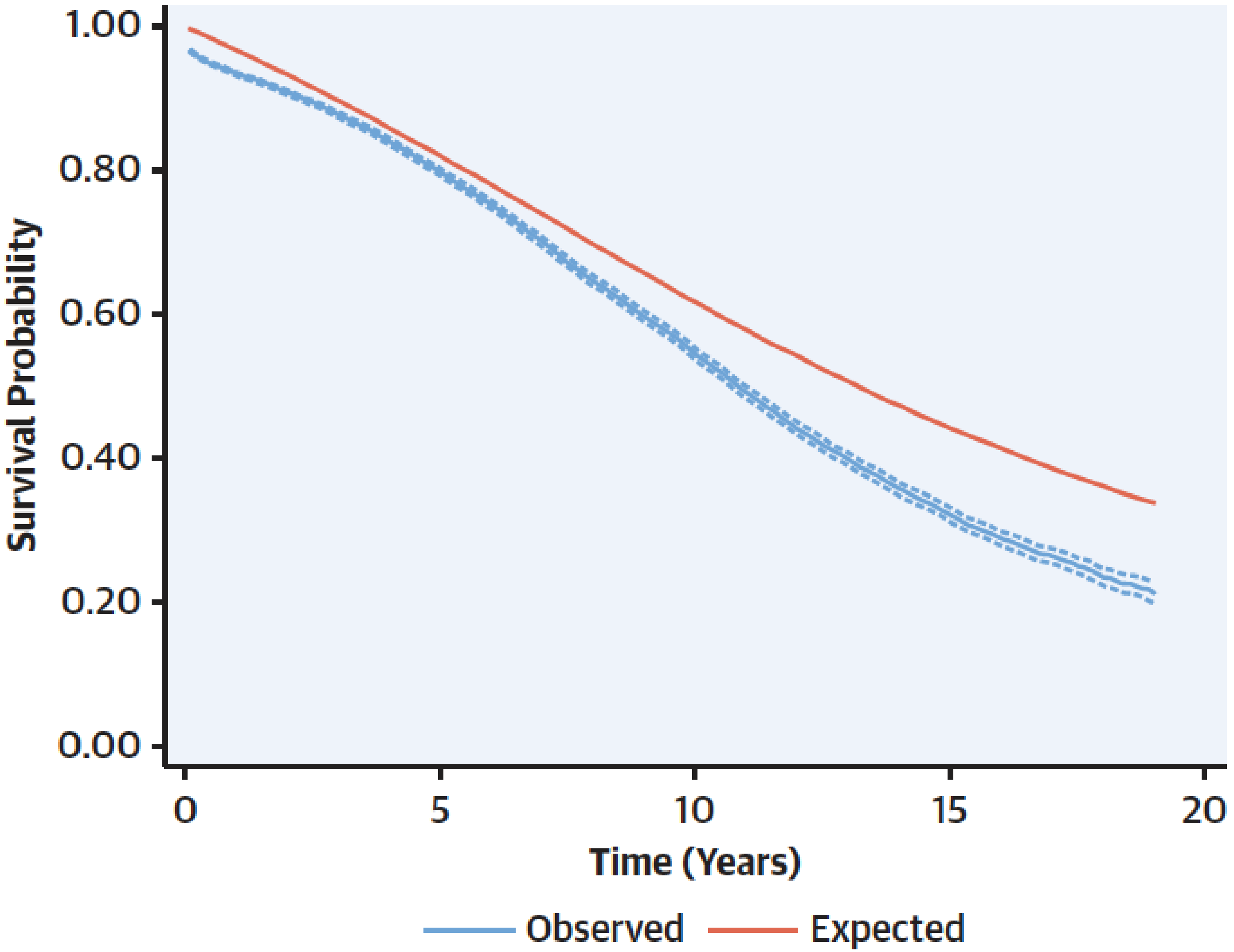
Loss in Life Expectancy After Surgical Aortic Valve Replacement

SWEDEHEART Study

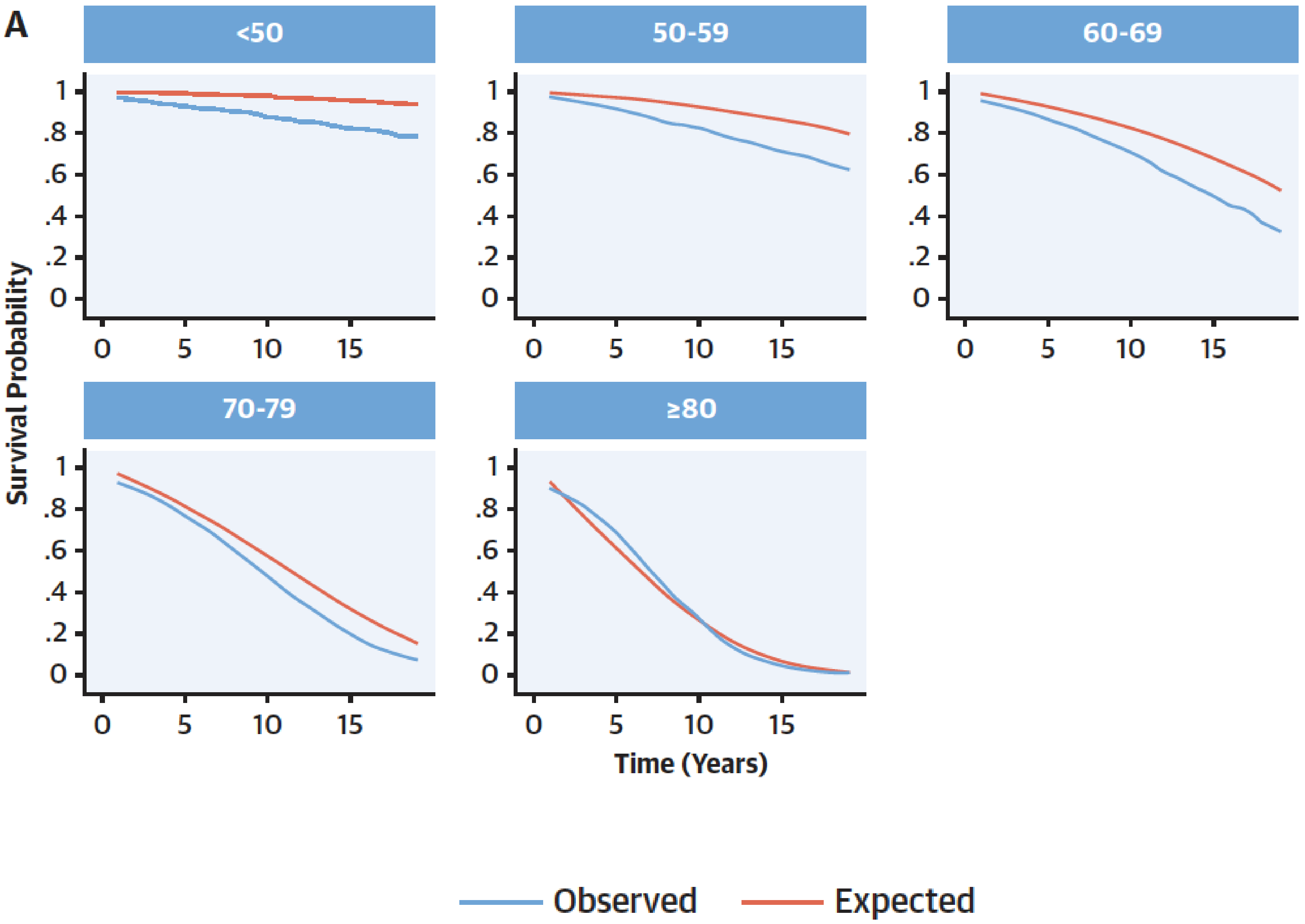
Natalie Glaser, MD, PHD,[a,b] Michael Persson, MD,[b,c] Veronica Jackson, MD, PHD,[b] Martin J. Holzmann, MD, PHD,[d,e] Anders Franco-Cereceda, MD, PHD,[b,c] Ulrik Sartipy, MD, PHD[b,c]

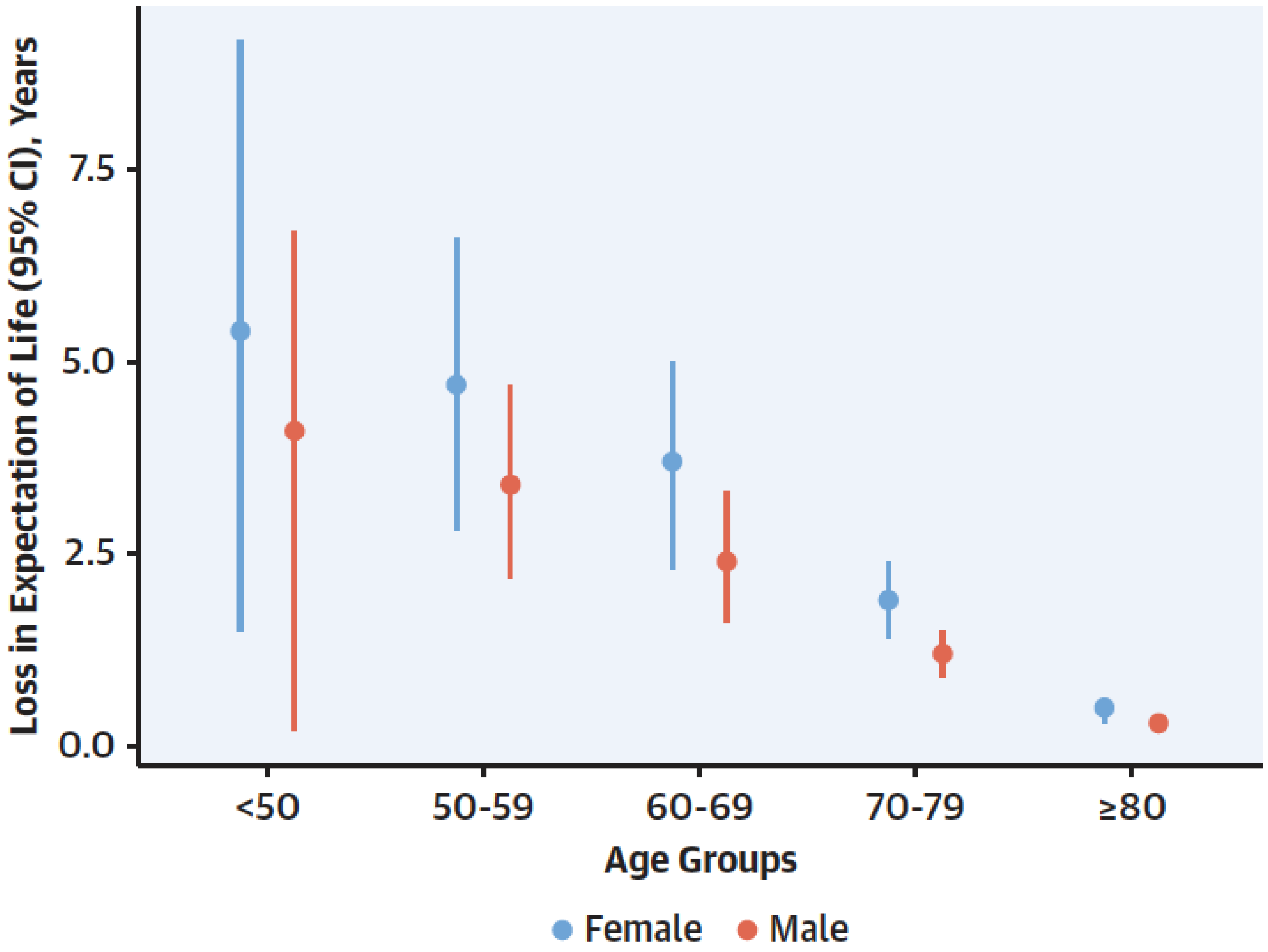
TABLE 1 Baseline Characteristics in 23,528 Patients Who Underwent Aortic Valve Replacement in Sweden Between 1995 and 2013

Age, yrs	70.7 ± 10.8
Female	9,296 (39.5)
Civil status	
Not married or cohabiting	6,937 (29.5)
Household disposable income, kSEK	213 (145, 310)
Education, yrs	
<10	8,096 (47.6)
10-12	6,107 (35.9)
>12	2,815 (16.5)
Region of birth	
Non-Nordic countries	979 (5.2)
Biological valve prosthesis	15,692 (66.7)
Body mass index, kg/m^2	26.7 ± 4.4
Diabetes mellitus	3,991 (17.0)
Atrial fibrillation	3,328 (14.1)
Hypertension	5,717 (24.3)
Hyperlipidemia	2,230 (9.5)
Stroke	2,240 (9.5)
Peripheral vascular disease	1,466 (6.2)
Chronic pulmonary disease	1,752 (7.4)
Prior myocardial infarction	3,522 (15.0)
Prior PCI	1,929 (8.2)
Prior major bleeding event	1,205 (5.1)
Alcohol dependency	383 (1.6)
Liver disease	206 (0.9)
Cancer	1,762 (7.5)
eGFR, ml/min/1.73 m^2	
>60	13,140 (66.8)
45-60	4,291 (21.8)
30-45	1,724 (8.8)
15-30	317 (1.6)
<15 or dialysis	201 (1.0)
Heart failure	4,494 (19.1)
Left ventricular ejection fraction, %	
>50	10,187 (72.8)
30-49	3,004 (21.5)
<30	799 (5.7)
Isolated AVR	13,727 (58.3)
Year of surgery	
1995-2000	7,403 (31.5)
2001-2006	7,030 (29.9)
2007-2013	9,095 (38.7)



The observed survival (95% confidence interval) in patients after aortic valve replacement **(blue line)** compared with the expected survival of an age-, sex-, and calendar-year-matched Swedish population **(red line).**


A
<50
50-59
60-69
70-79
≥80
Survival Probability
1
.8
.6
.4
.2
0
0
5
10
15
Time (Years)
Observed
Expected

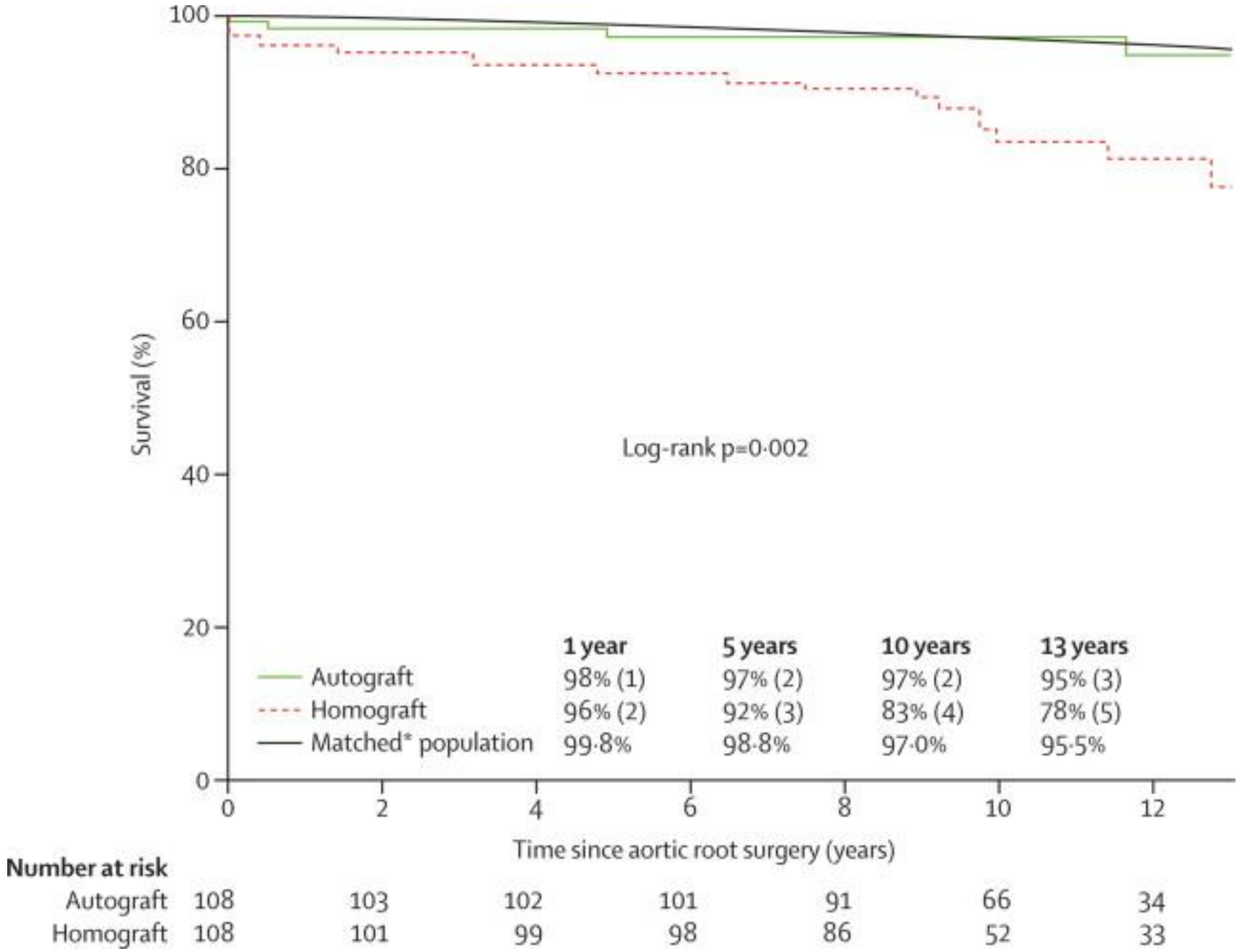


Glaser, N. et al. J Am Coll Cardiol. 2019;74(1):26-33.

The loss in life expectancy (95% confidence interval [CI]) expressed in years according to sex and age categories in 23,528 patients who underwent aortic valve replacement in Sweden between 1995 and 2013.

- **Mean Fup : 6.8 years (max 19.2 years)**
- **30 days mortality: 3.5%; 41% cardiac deaths**
- **After 19 years 37% would have died due to AVR causes**
- **Loss in life expectancy 1.9%**
  - **4.4 years when < 50 years**
  - **0.4 years when 80 years and more**

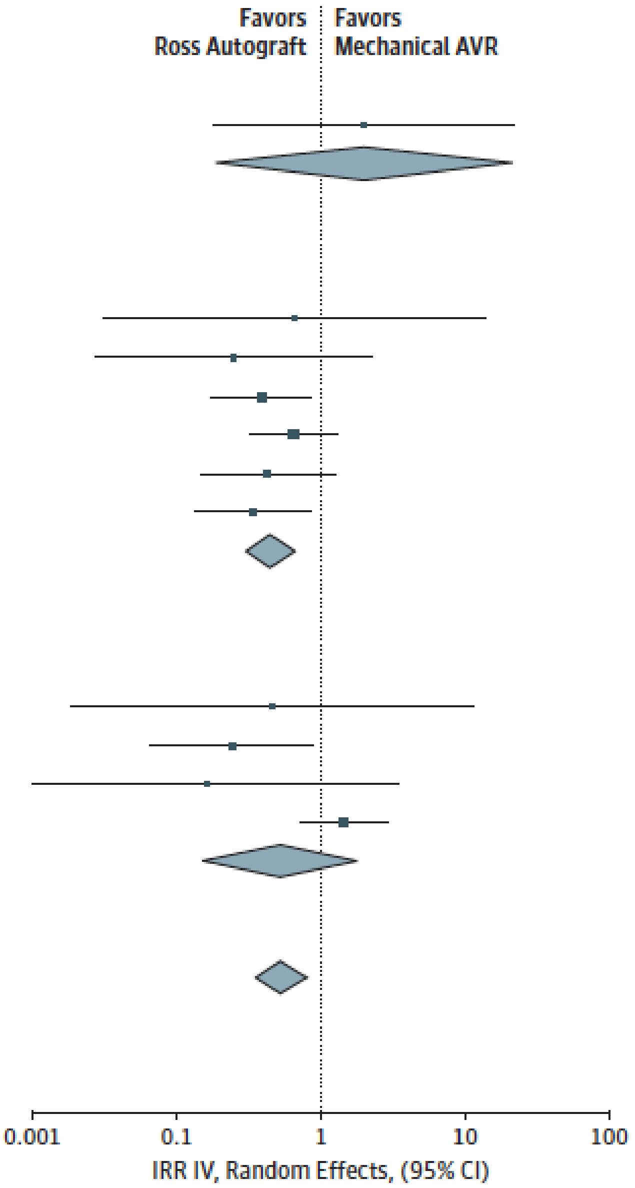
Survie et Substitut valvulaire



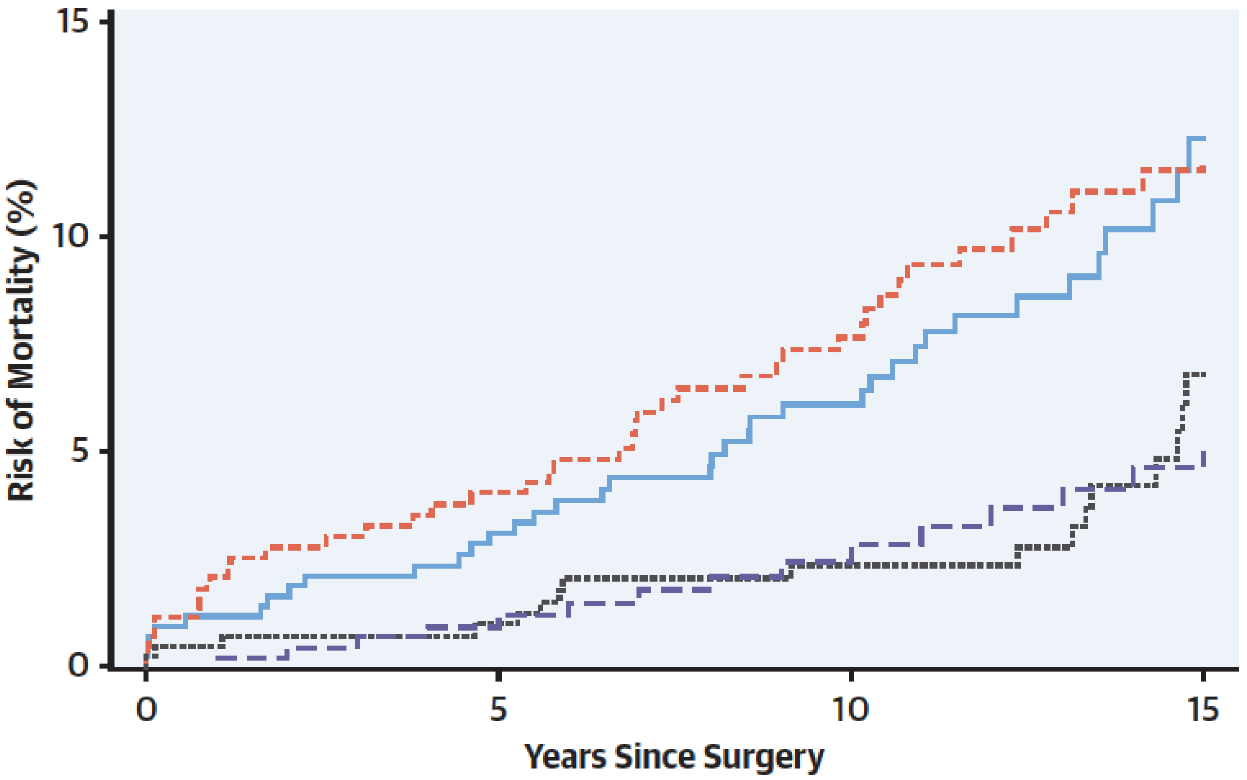
El Hamamsy I , Lancet 2010

Figure 1. All-Cause Mortality

Study or Subgroup	Mean Follow-up, y	log (IRR)	SE	Ross Total	AVR Total	IRR IV, Random (95% CI)	Weight, %
Randomized trial							
Doss et al,[26] 2005	1.0	0.6931	1.2247	20	20	2.00 (0.18-22.05)	3.0
Subtotal (95% CI)				20	20	2.00 (0.18-22.05)	3.0
Heterogeneity: not applicable							
Test for overall effect: $z = 0.57$ ($P = .57$)							
Matched/adjusted observational							
Jaggers et al,[27] 1998	1.7	-0.4185	1.5492	22	27	0.66 (0.03-13.71)	1.9
Concha et al,[30] 2005	2.5	-1.4023	1.1180	63	62	0.25 (0.03-2.20)	3.5
Andreas et al,[32] 2014	8.9	-0.9555	0.4019	159	173	0.38 (0.17-0.85)	16.4
Mazine et al,[33] 2016	14.0	-0.4415	0.3498	208	208	0.64 (0.32-1.28)	18.9
Sharabiani et al,[34] 2016	5.3	-0.8544	0.5380	224	468	0.43 (0.15-1.22)	11.4
Buratto et al,[36] 2018	10.0	-1.0986	0.4644	275	275	0.33 (0.13-0.83)	13.8
Subtotal (95% CI)				951	1213	0.45 (0.30-0.67)	65.9
Heterogeneity: $\tau^2 = 0.00$; $\chi^2 = 1.97$, $df = 5$ ($P = .85$); $I^2 = 0\%$							
Test for overall effect: $z = 3.88$ ($P < .001$)							
Unmatched/unadjusted observational							
Akhyari et al,[39] 2009	3.7	-0.7742	1.6330	18	20	0.46 (0.02-11.32)	1.7
Klieverik et al,[37] 2006	7.0	-1.4250	0.6567	81	204	0.24 (0.07-0.87)	8.5
Zsolt et al,[38] 2008	5.4	-1.8140	1.5492	17	17	0.16 (0.01-3.40)	1.9
Mokhles et al,[31] 2011	6.0	0.3706	0.3469	925	408	1.45 (0.73-2.86)	19.0
Subtotal (95% CI)				1041	649	0.53 (0.15-1.91)	31.2
Heterogeneity: $\tau^2 = 0.88$; $\chi^2 = 7.30$, $df = 3$ ($P = .06$); $I^2 = 59\%$							
Test for overall effect: $z = 0.97$ ($P = .33$)							
Total (95% CI)				2012	1882	0.54 (0.35-0.82)	100.0
Heterogeneity: $\tau^2 = 0.13$; $\chi^2 = 13.95$, $df = 10$ ($P = .18$); $I^2 = 28\%$							
Test for overall effect: $z = 2.85$ ($P = .004$)							
Test for subgroup differences: $\chi^2 = 1.47$; $df = 2$ ($P = .48$); $I^2 = 0\%$							



Mazine A JAMA;2018



Number at Risk

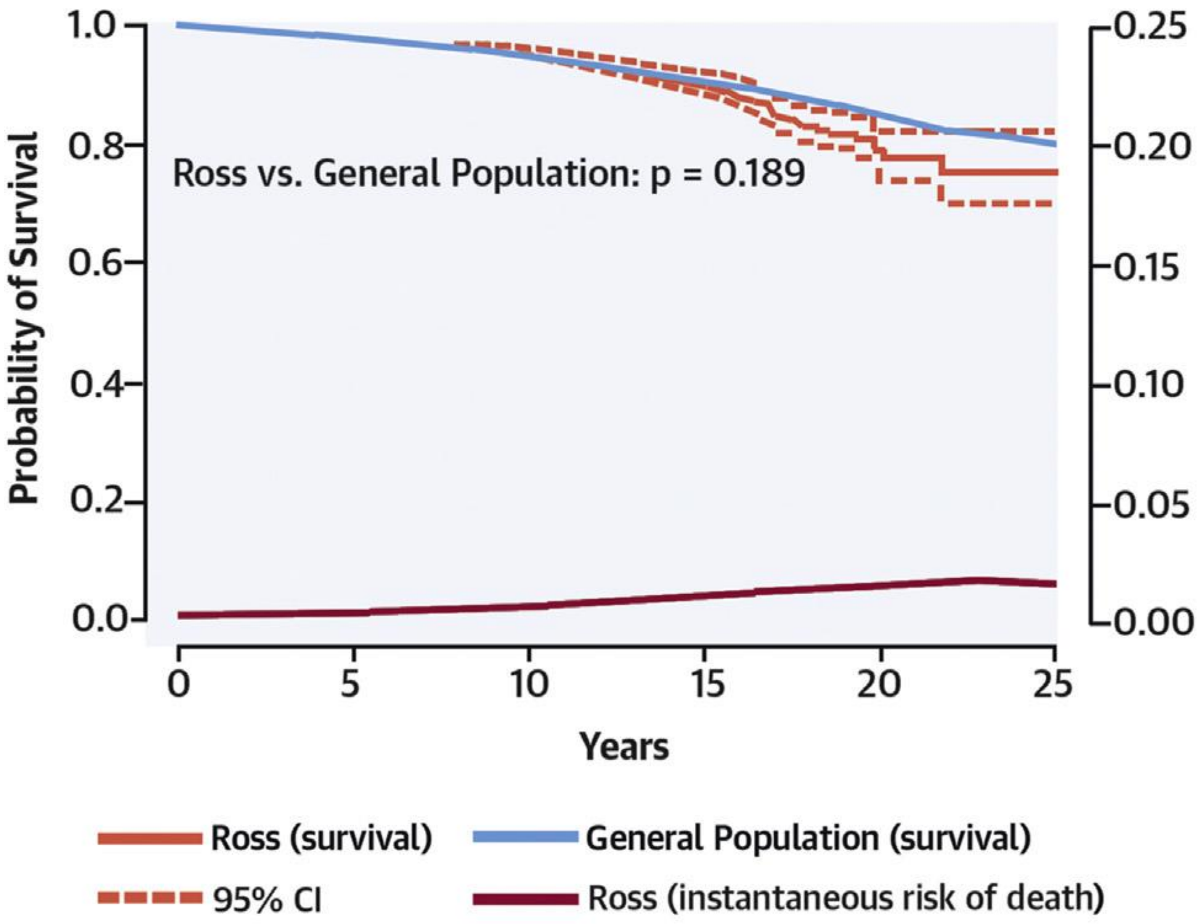
Bioprosthetic	434	386	290	113
Mechanical	434	369	287	131
Ross	434	376	298	129

Bioprosthetic --- Mechanical ----- Ross --- General Population

At 15 years, the cumulative incidence of all-cause mortality is significantly lower after the Ross procedure **(gray)** compared with biological aortic valve replacement **(blue)** (HR: 0.42; $P = 0.003$) or mechanical aortic valve replacement **(red)** (HR: 0.45; $P = 0.006$). Survival after the Ross procedure is equivalent to that of the age-, sex-, and race-matched U.S. general population **(purple)**.

El-Hamamsy JACC 2022;

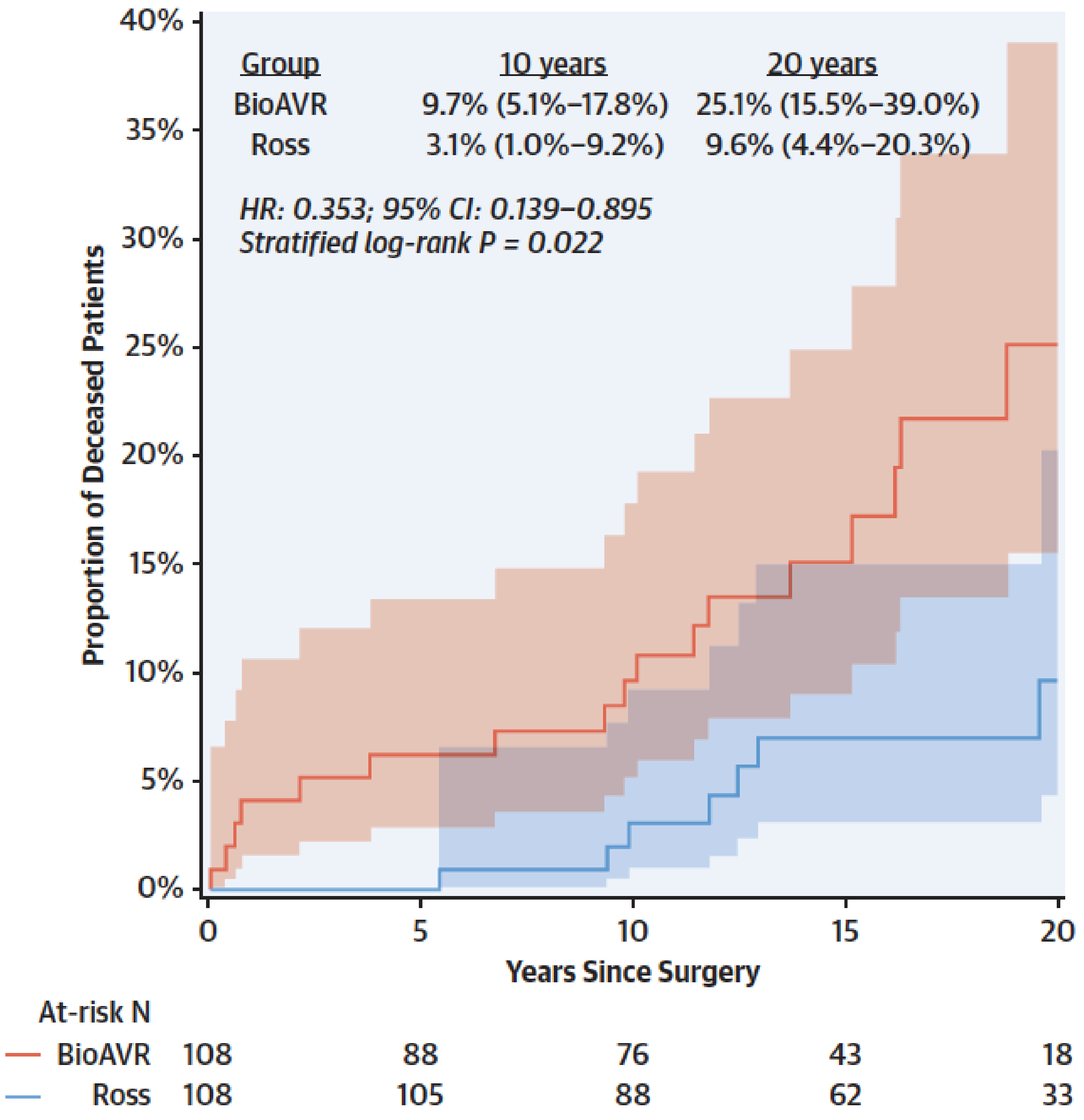
Adult Population



Patients at Risk

2,271	1,694	1,104	568	116	30

Aboud, A. et al. J Am Coll Cardiol. 2021;77(11):1412–22



Mazine, A. et al. J Am Coll Cardiol. 2022;79(10):993-1005.

Comorbidités et substitut

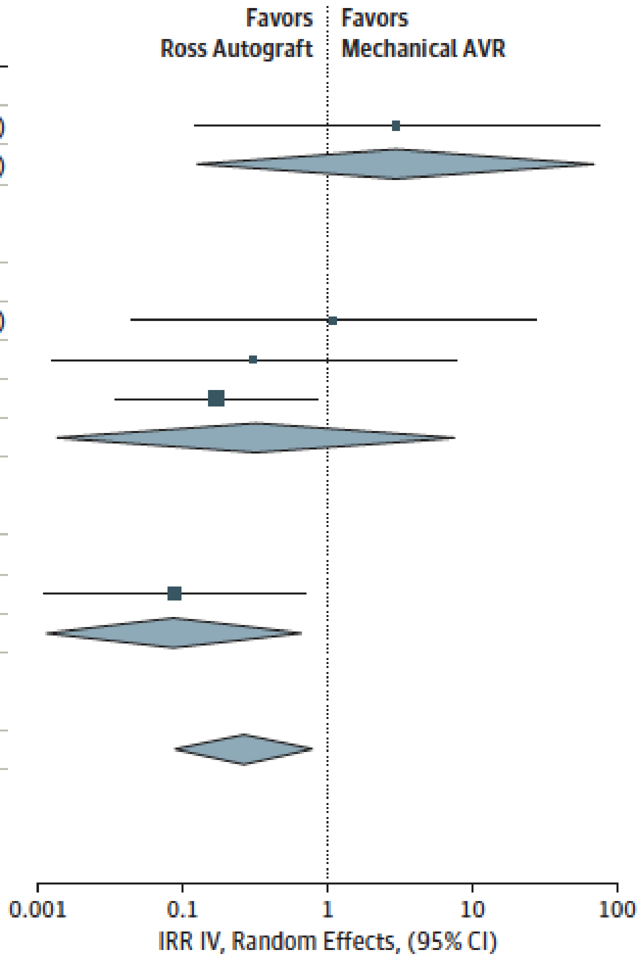
Figure 3. Stroke at Follow-up

Study or Subgroup	Mean Follow-up, y	log (IRR)	SE	Ross Total	AVR Total	IRR IV, Random (95% CI)	Weight, %
Randomized clinical trial							
Doss et al,[26] 2005	1.0	1.0986	1.633	20	20	3.00 (0.12-73.64)	11.4
Subtotal (95% CI)				20	20	3.00 (0.12-73.64)	11.4
Heterogeneity: not applicable							
Test for overall effect: $z = 0.67$ ($P = .50$)							
Matched/adjusted observational							
Jaggers et al,[27] 1998	1.7	0.0924	1.633	22	27	1.10 (0.04-26.92)	11.4
Concha et al,[30] 2005	2.5	-1.1651	1.633	62	58	0.31 (0.01-7.66)	11.4
Mazine et al,[33] 2016	14.0	-1.7579	0.810	207	207	0.17 (0.04-0.84)	40.1
Subtotal (95% CI)				291	292	0.26 (0.07-0.95)	62.8
Heterogeneity: $\tau^2 = 0.00$; $\chi^2 = 1.05$, $df = 2$ ($P = .59$); $I^2 = 0\%$							
Test for overall effect: $z = 2.04$ ($P = .04$)							
Unmatched/unadjusted observational							
Andreas et al,[32] 2014	8.9	-2.4364	1.0488	156	171	0.09 (0.01-0.68)	25.8
Subtotal (95% CI)				156	171	0.09 (0.01-0.68)	25.8
Heterogeneity: not applicable							
Test for overall effect: $z = 2.32$ ($P = .02$)							
Total (95% CI)				467	483	0.26 (0.09-0.80)	100.0

Heterogeneity: $\tau^2 = 0.14$; $\chi^2 = 4.37$, $df = 4$ ($P = .36$); $I^2 = 8\%$

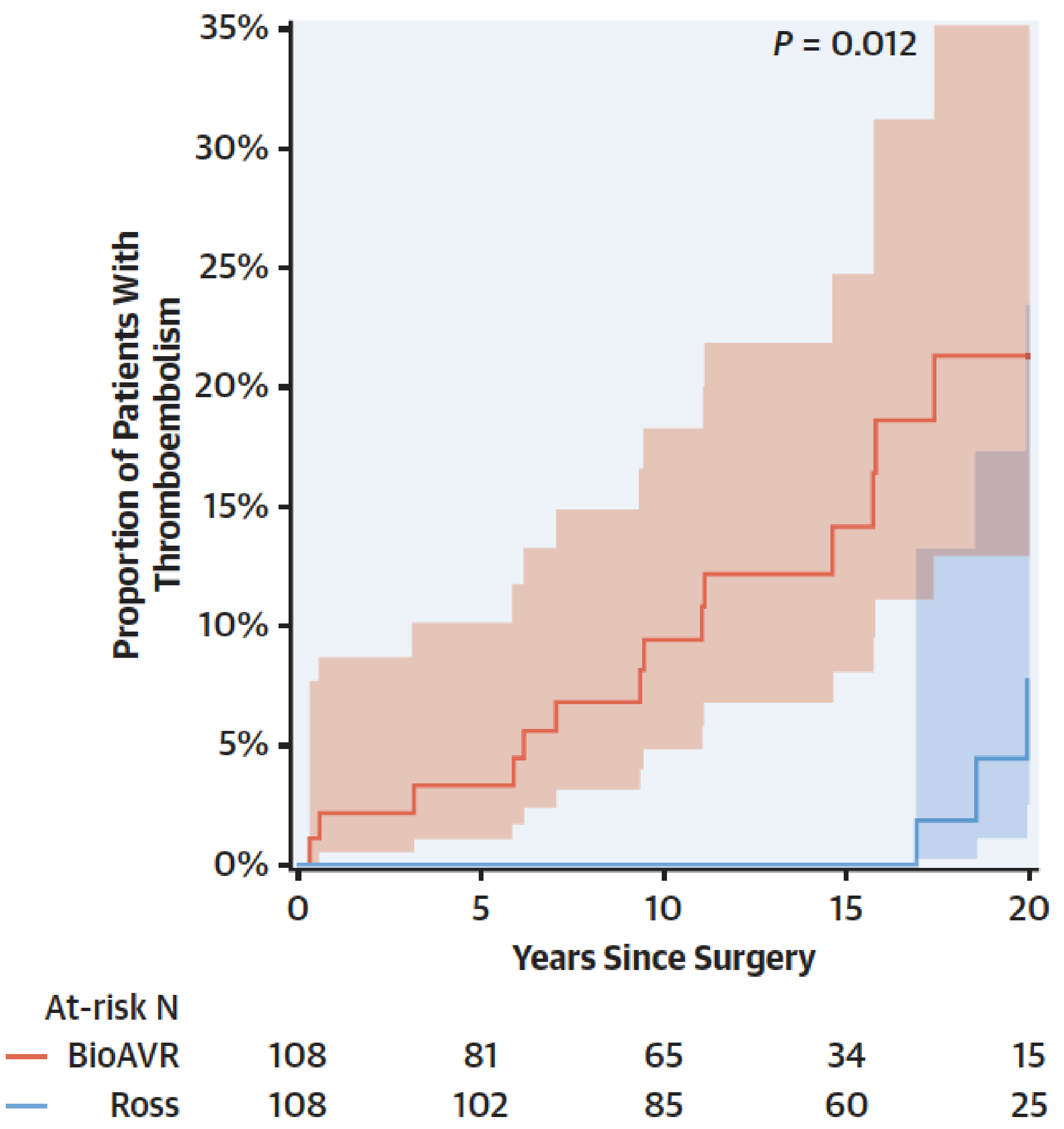
Test for overall effect: $z = 2.35$ ($P = .02$)

Test for subgroup differences: $\chi^2 = 3.32$; $df = 2$ ($P = .19$); $I^2 = 39.8\%$



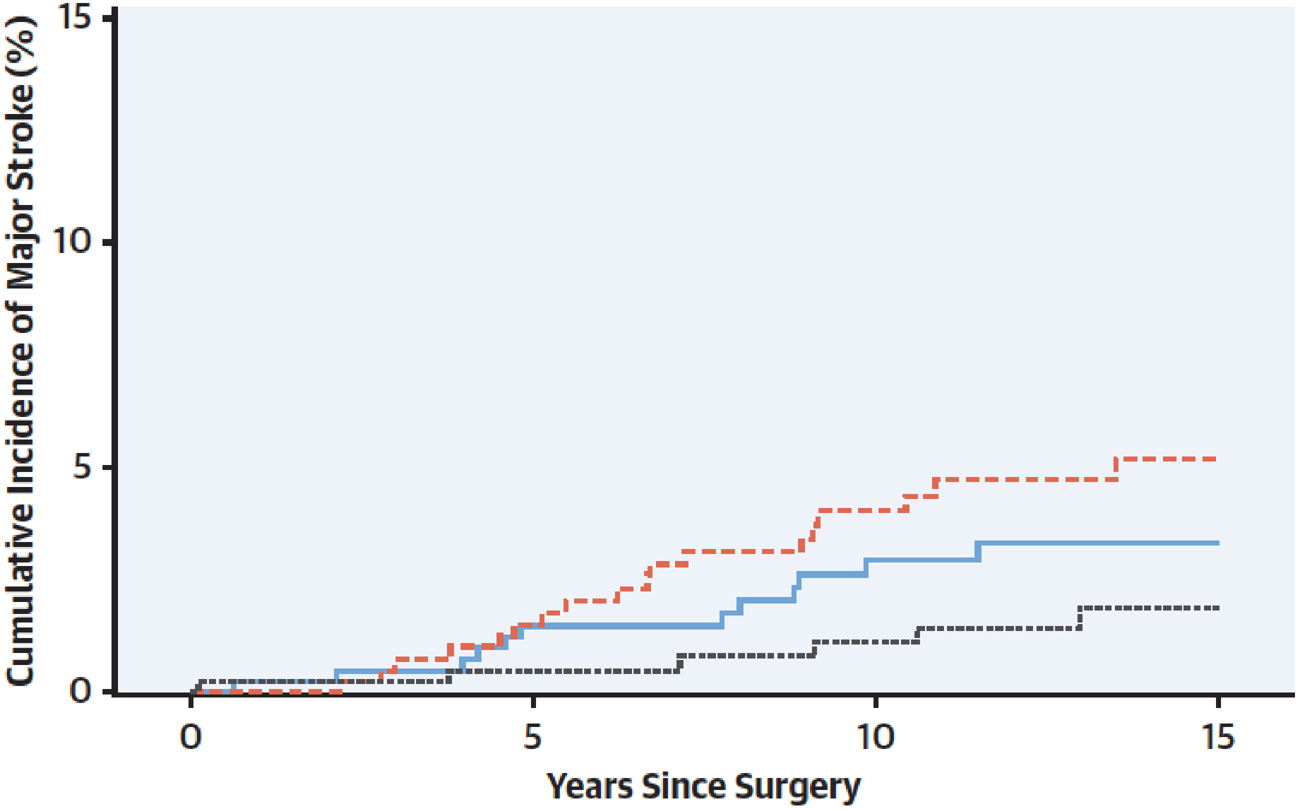
Mazine A JAMA;2018

FIGURE 4 Cumulative Incidence of Thromboembolic Events



Mazine A JACC 2022

FIGURE 2 Long-Term Cumulative Incidence of Stroke



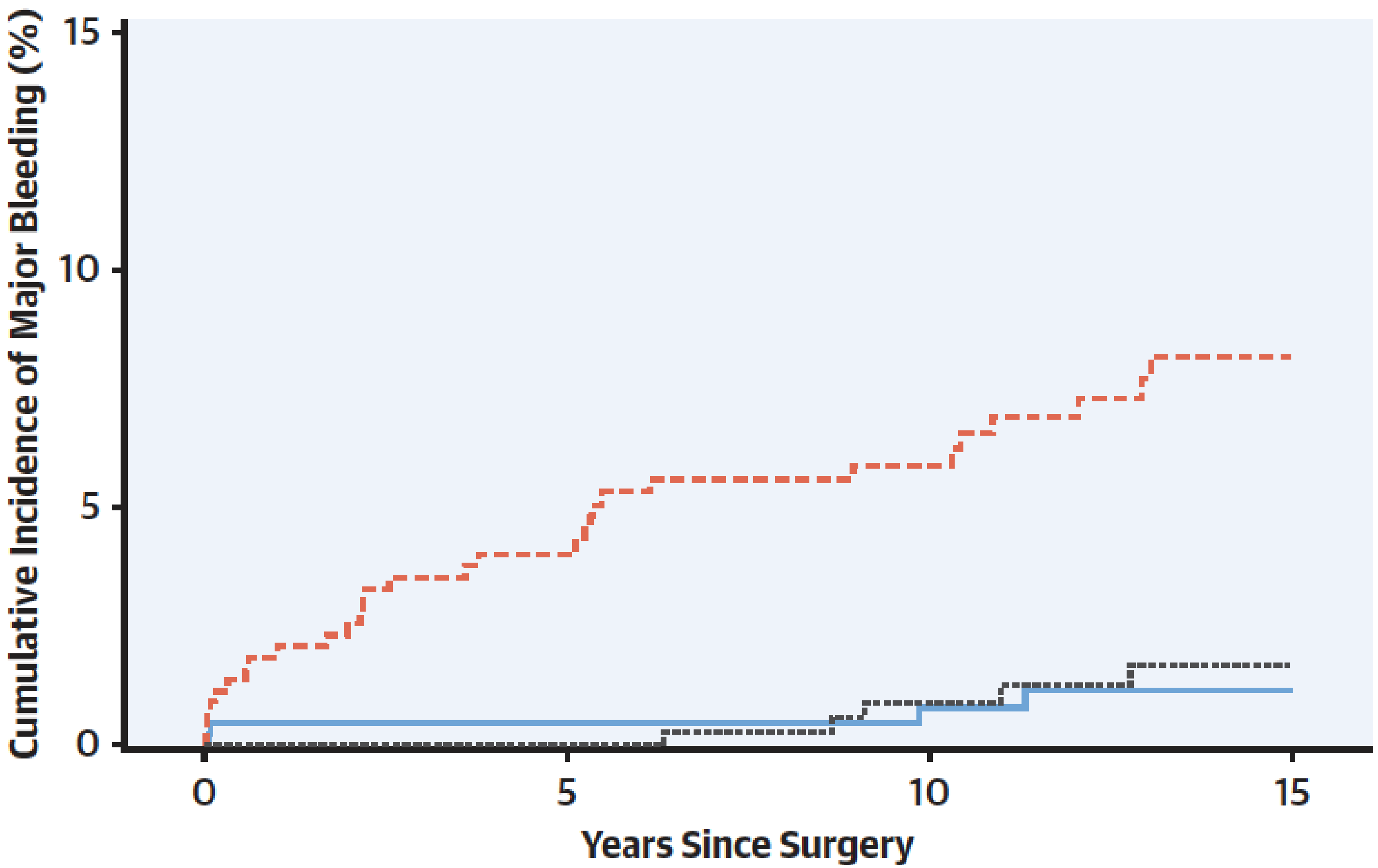
Number at Risk

	0	5	10	15
Bioprosthetic	434	381	283	111
Mechanical	434	364	276	126
Ross	434	375	295	125

At 15 years, the cumulative incidence of stroke after mechanical aortic valve replacement **(red)** is 4.8%, which is significantly higher than that observed after biological aortic valve replacement **(blue)** (3.3%) or the Ross procedure **(gray)** (2.1%).

El-Hamamsy JACC 2022;

FIGURE 3 Long-Term Cumulative Incidence of Major Bleeding

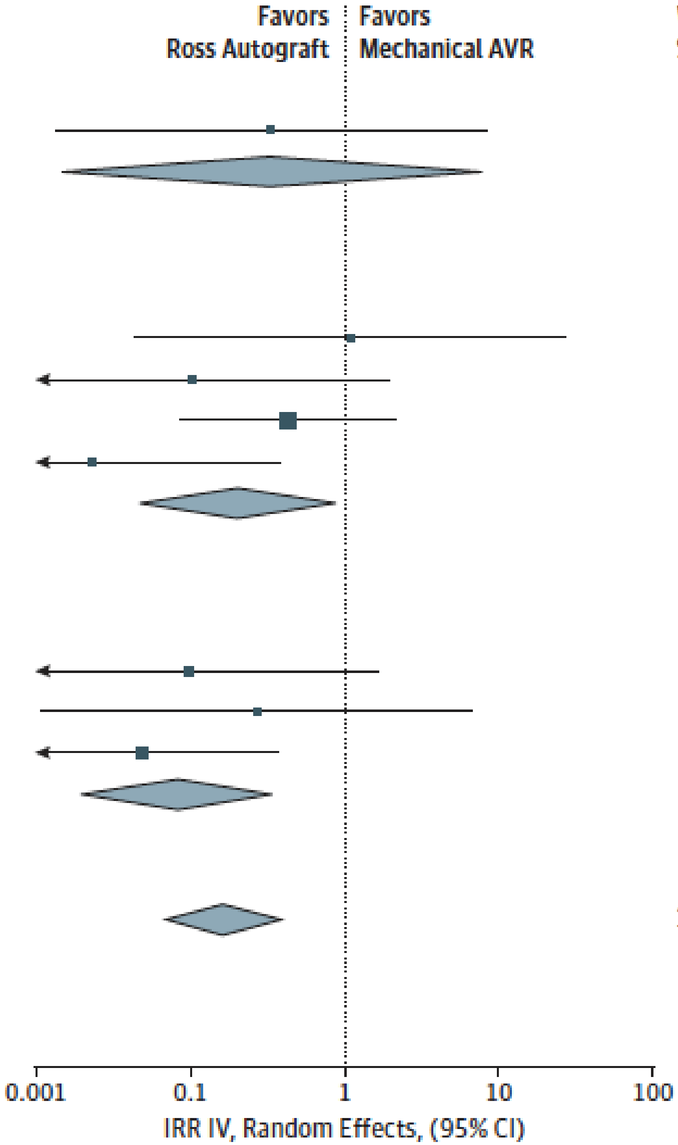


Number at Risk

	0	5	10	15
Bioprosthetic	434	384	288	112
Mechanical	434	355	276	122
Ross	434	376	295	126

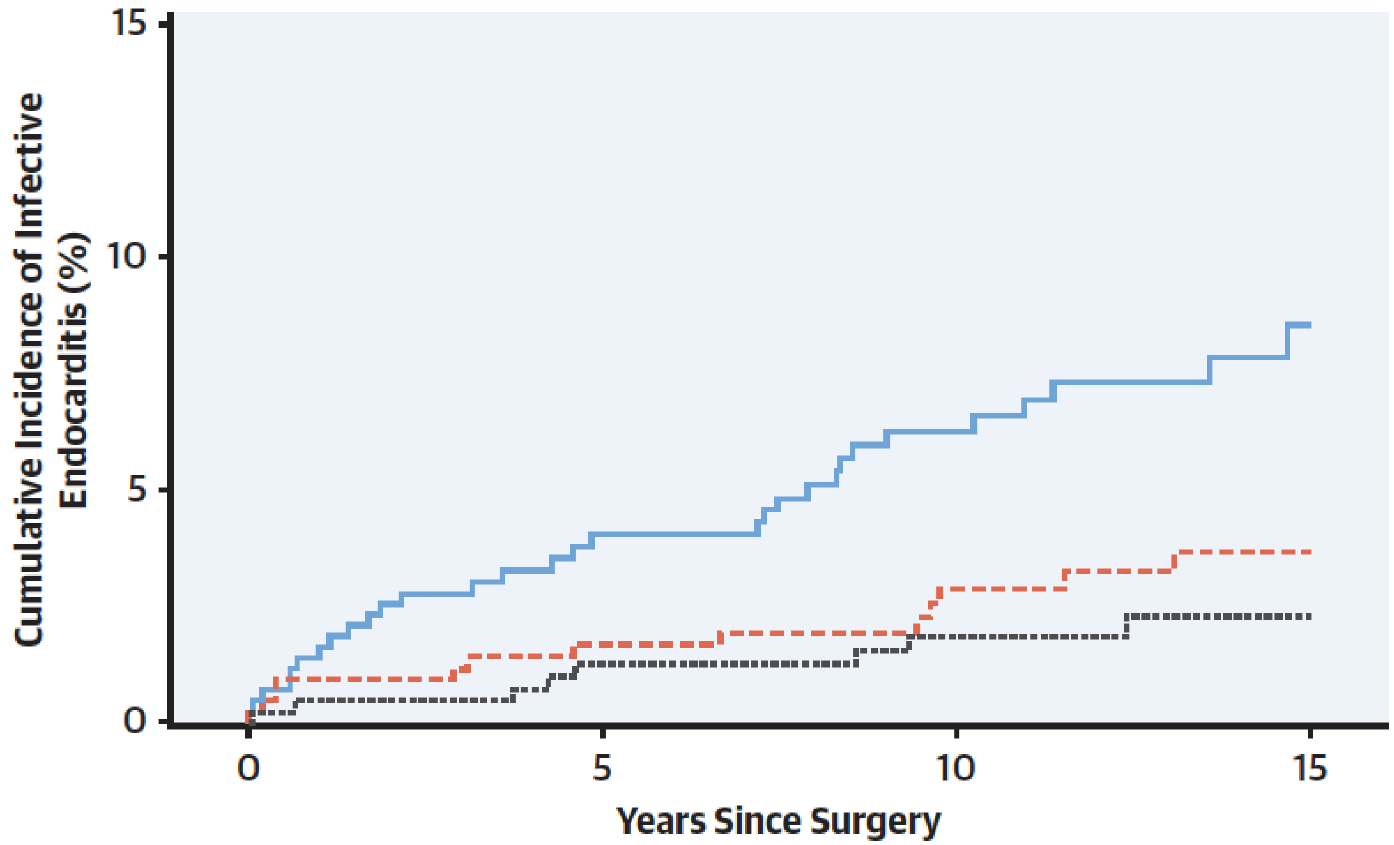
Figure 4. Major Bleeding at Follow-up

Study or Subgroup	Mean Follow-up, y	log (IRR)	SE	Ross Total	AVR Total	IRR IV, Random (95% CI)	Weight, %
Randomized clinical trial							
Doss et al,[26] 2005	1.0	−1.0986	1.6330	20	20	0.33 (0.01-8.18)	7.5
Subtotal (95% CI)				20	20	0.33 (0.01-8.18)	7.5
Heterogeneity: not applicable							
Test for overall effect: $z = 0.67$ ($P = .50$)							
Matched/adjusted observational							
Jaggers et al,[27] 1998	1.7	0.0924	1.6330	22	27	1.10 (0.04-26.92)	7.5
Concha et al,[30] 2005	2.5	-2.2637	1.4907	62	58	0.10 (0.01-1.93)	9.0
Mokhles et al,[31] 2011	6.0	-0.8487	0.8165	253	253	0.43 (0.09-2.12)	30.1
Mazine et al,[33] 2016	14.0	-3.7656	1.4292	207	207	0.02 (0.00-0.38)	9.8
Subtotal (95% CI)				544	545	0.21 (0.05-0.93)	56.4
Heterogeneity: $\tau^2 = .75$; $\chi^2 = 4.36$, $df = 3$ ($P = .23$); $I^2 = 31\%$							
Test for overall effect: $z = 2.06$ ($P = .04$)							
Unmatched/unadjusted observational							
Klieverik et al,[37] 2006	7.0	-2.3327	1.4475	79	200	0.10 (0.01-1.66)	9.6
Zsolt et al,[38] 2008	5.4	-1.3032	1.6330	17	17	0.27 (0.01-6.67)	7.5
Andreas et al,[32] 2014	8.9	-3.0242	1.0274	156	171	0.05 (0.01-0.36)	19.0
Subtotal (95% CI)				252	388	0.08 (0.02-0.36)	36.1
Heterogeneity: $\tau^2 = 0.00$; $\chi^2 = 0.81$, $df = 2$ ($P = .67$); $I^2 = 0\%$							
Test for overall effect: $z = 3.33$ ($P < .001$)							
Total (95% CI)				816	953	0.17 (0.07-0.40)	100.0
Heterogeneity: $\tau^2 = 0.00$; $\chi^2 = 6.52$, $df = 7$ ($P = .48$); $I^2 = 0\%$							
Test for overall effect: $z = 4.02$ ($P < .001$)							
Test for subgroup differences: $\chi^2 = 1.01$; $df = 2$ ($P = .60$); $I^2 = 0\%$							



Mazine A JAMA;2018

FIGURE 5 Long-Term Cumulative Incidence of Endocarditis

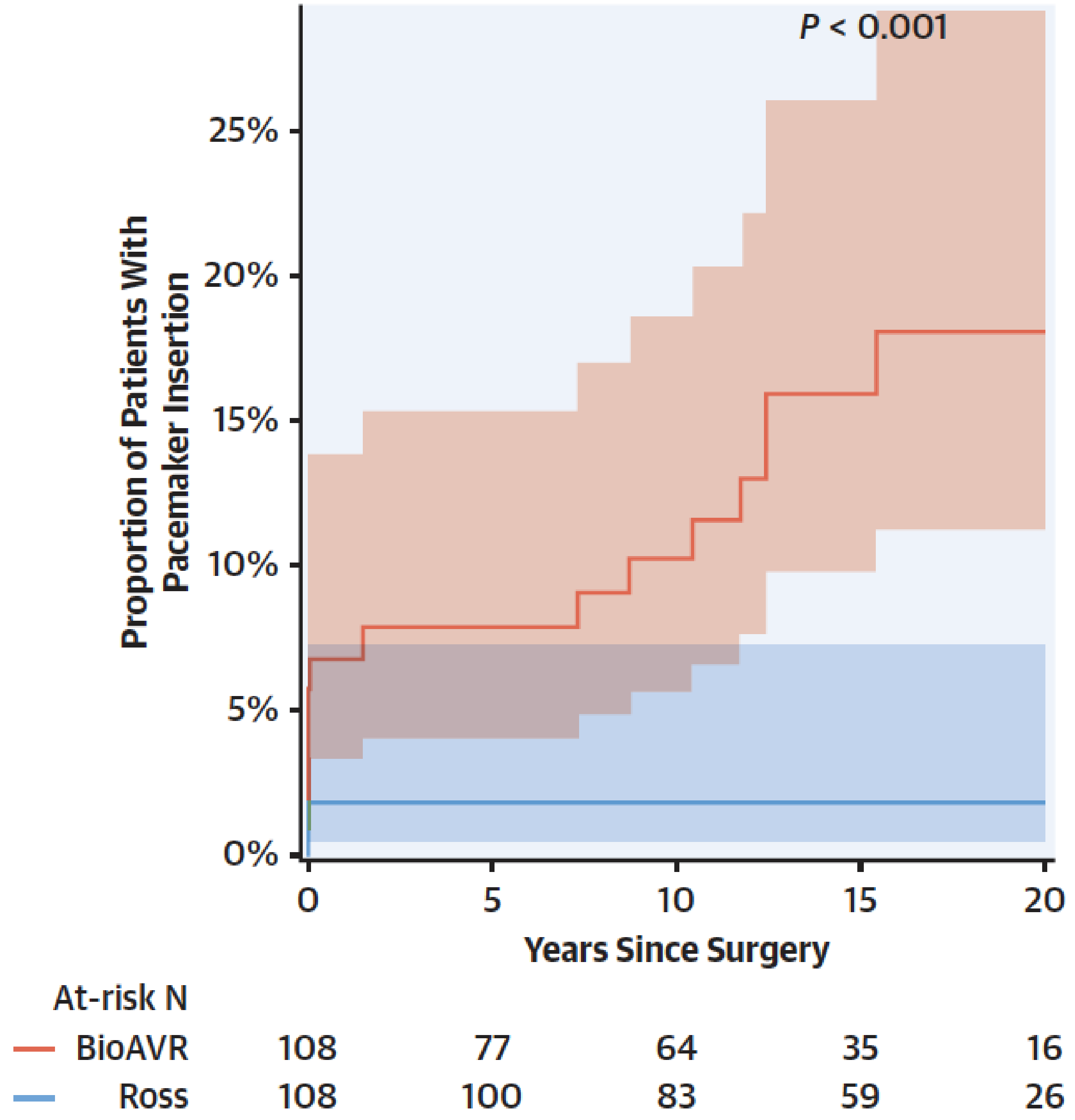


Number at Risk

	0	5	10	15
Bioprosthetic	434	375	275	109
Mechanical	434	366	281	127
Ross	434	372	293	128

El-Hamamsy JACC 2022;

FIGURE 5 Cumulative Incidence of Permanent Pacemaker Implantation



Ré-interventions

Figure 2. Any Operated Valve Reintervention

Study or Subgroup	Mean Follow-up, y	log (IRR)	SE	Ross Total	AVR Total	IRR IV, Random (95% CI)	Weight, %
Randomized clinical trial							
Doss et al,[26] 2005	1.0	1.6094	1.5492	20	20	5.00 (0.24-104.14)	1.8
Subtotal (95% CI)				20	20	5.00 (0.24-104.14)	1.8
Heterogeneity: not applicable							
Test for overall effect: $z = 1.04$ ($P = .30$)							
Matched/adjusted observational							
Jaggers et al,[27] 1998	1.7	0.1095	1.1547	22	27	1.12 (0.12-10.73)	3.3
Concha et al,[30] 2005	2.5	1.3196	1.1180	62	58	3.74 (0.42-33.48)	3.5
Mokhles et al,[31] 2011	6.0	3.0831	1.4552	253	253	21.83 (1.26-378.13)	2.1
Mazine et al,[33] 2016	14.0	0.6206	0.4775	207	207	1.86 (0.73-4.74)	19.2
Sharabiani et al,[34] 2016	5.3	-0.0953	0.4246	224	468	0.91 (0.40-2.09)	24.3
Subtotal (95% CI)				768	1013	1.70 (0.79-3.68)	52.4
Heterogeneity: $\tau^2 = 0.22$; $\chi^2 = 5.71$, $df = 4$ ($P = .22$); $I^2 = 30\%$							
Test for overall effect: $z = 1.35$ ($P = .18$)							
Unmatched/unadjusted observational							
Klieverik et al,[37] 2006	7.0	0.9163	0.5733	79	200	2.50 (0.81-7.69)	13.3
Zsolt et al,[38] 2008	5.4	0.8941	1.6330	17	17	2.45 (0.10-60.02)	1.6
Akhyari et al,[39] 2009	3.7	1.4231	1.6330	18	20	4.15 (0.17-101.87)	1.6
Andreas et al,[32] 2014	8.9	0.5592	0.3873	156	171	1.75 (0.82-3.74)	29.2
Subtotal (95% CI)				270	408	2.03 (1.11-3.71)	45.8
Heterogeneity: $\tau^2 = 0.00$; $\chi^2 = .48$, $df = 3$ ($P = .92$); $I^2 = 0\%$							
Test for overall effect: $z = 2.28$ ($P = .02$)							
Total (95% CI)				1058	1441	1.76 (1.16-2.65)	100.0
Heterogeneity: $\tau^2 = 0.00$; $\chi^2 = 7.18$, $df = 9$ ($P = .62$); $I^2 = 0\%$							
Test for overall effect: $z = 2.69$ ($P = .007$)							
Test for subgroup differences: $\chi^2 = .50$; $df = 2$ ($P = .78$); $I^2 = 0\%$							

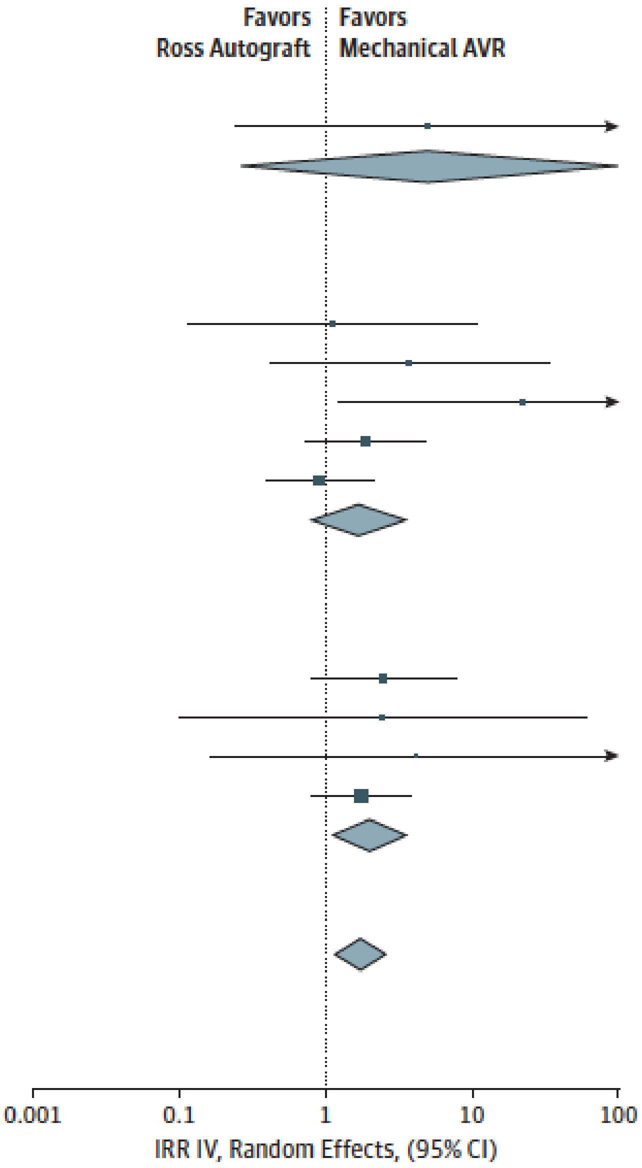
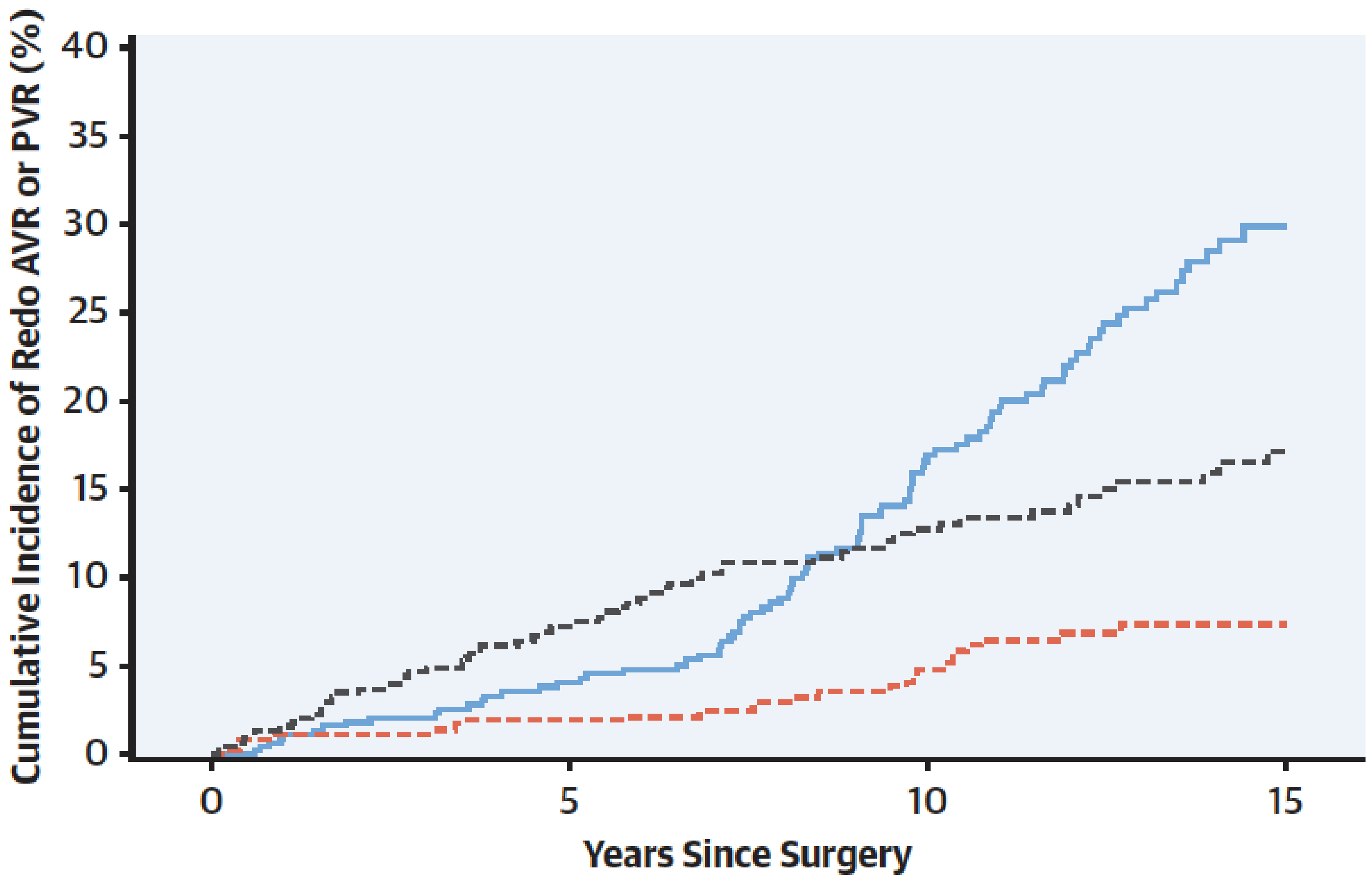


FIGURE 4 Long-Term Cumulative Incidence of Any Aortic and/or Pulmonary Reoperation



Number at Risk

Bioprosthetic	434	373	244	77
Mechanical	434	362	273	118
Ross	434	349	257	110

FIGURE 2 Cumulative Incidence of Valve Deterioration

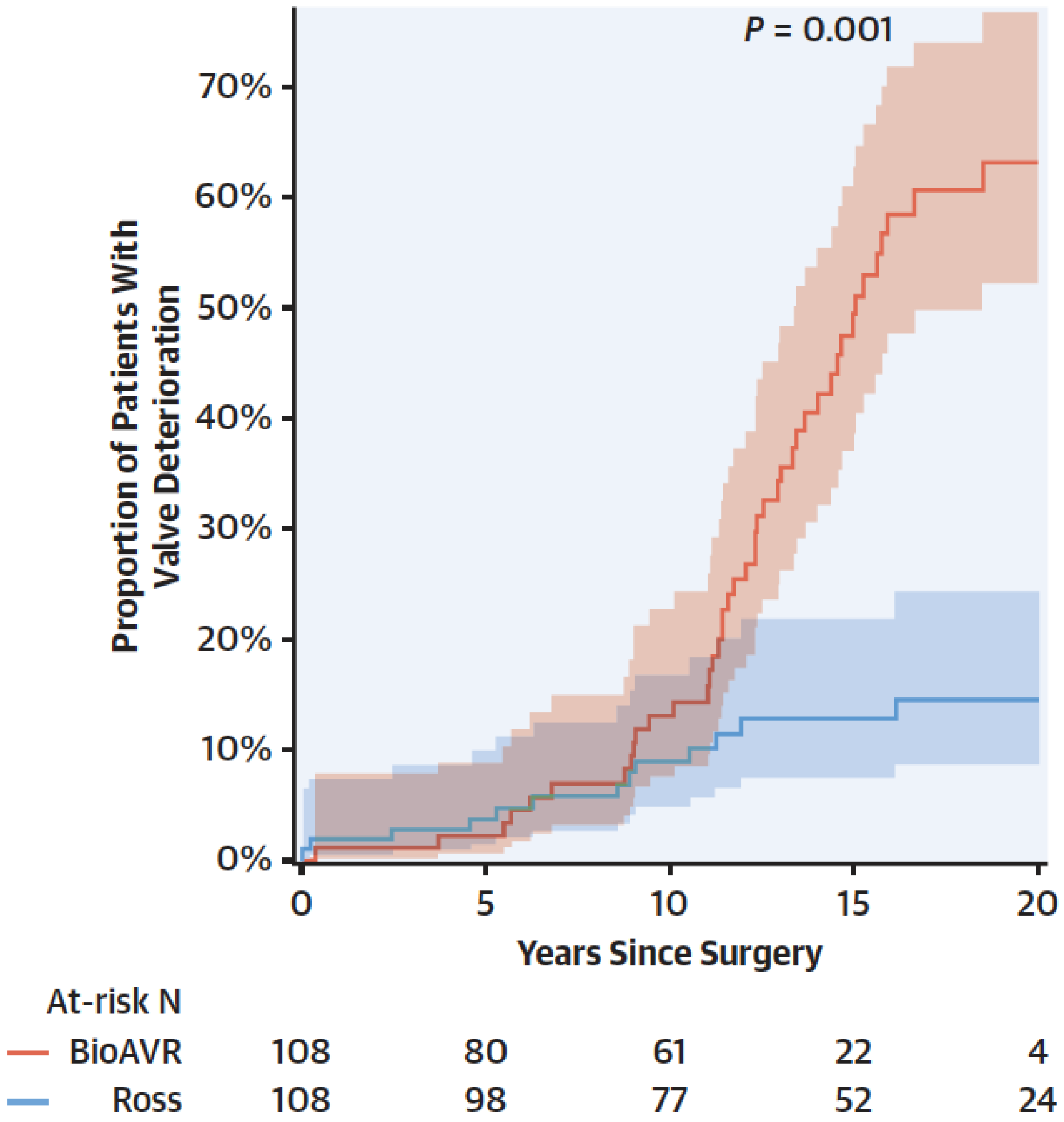
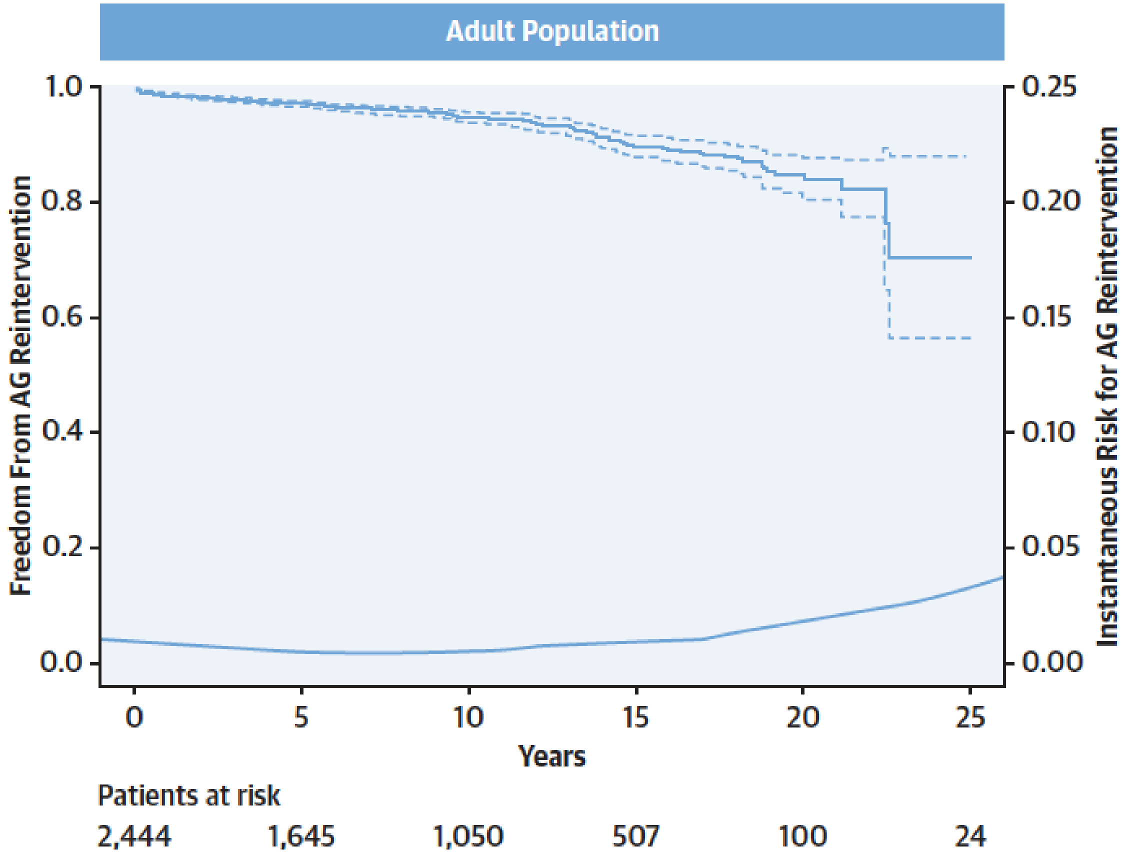


FIGURE 1 Freedom From Aortic Graft Reintervention

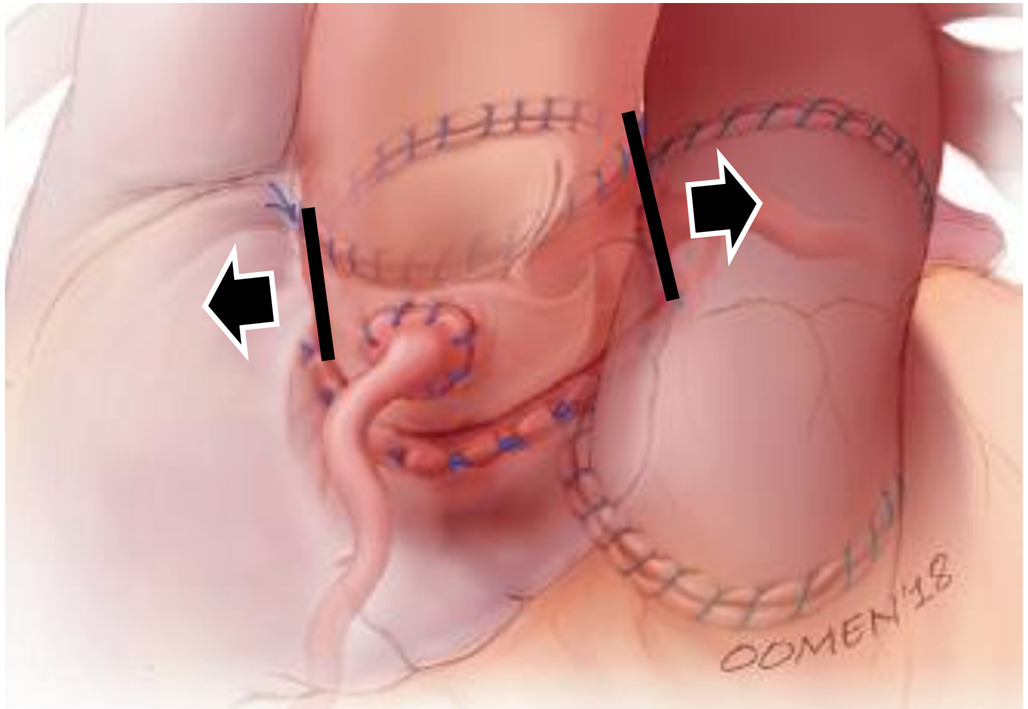


Kaplan-Meier estimates are shown for freedom from aortic graft (AG) reintervention and instantaneous risk of AG reintervention.

Expérience Lilloise

PROBLEMATIQUE

Freestanding root replacement



Talon d'Achille :

dilatation de l'autogreffe *libre* ≈ 50% à 10 ans

1ère cause de réintervention

IAo préopératoire, anneau aortique dilaté, sexe ♂

Simon-Kupilik et al., Eur J Cardiothorac Surg. 2002
Frigiola et al., Ann Thorac Surg. 2008
Klieverik et al., Eur Heart J. 2007
David et al., J Thorac Cardiovas Surg. 2014

PROBLEMATIQUE

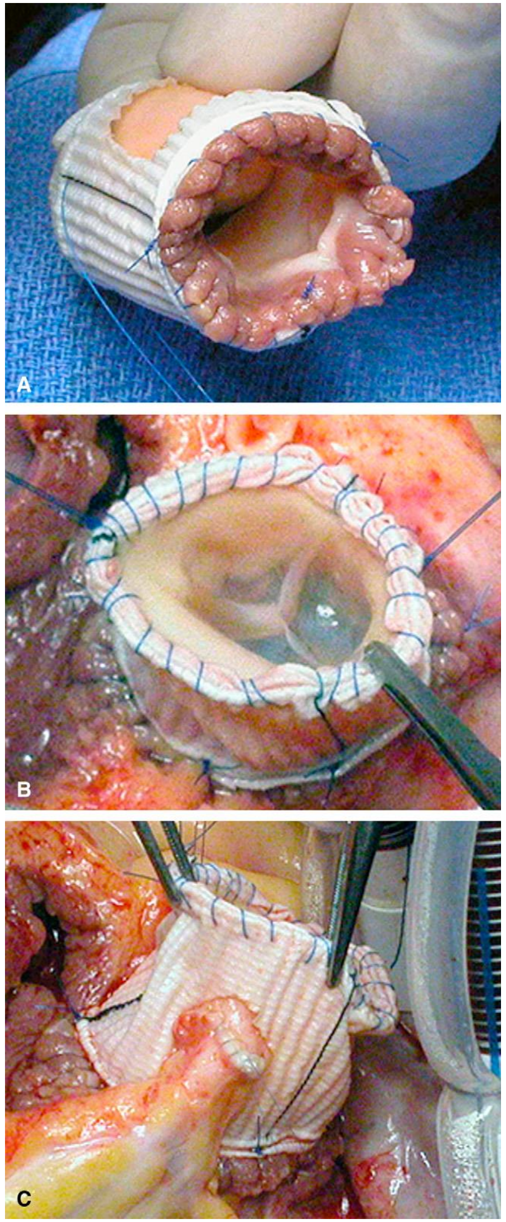
Renforcement de l'autogreffe → inclusion prothétique Valsalva

Modified Ross operation with reinforcement of the pulmonary autograft: Six-year results

Francis Juthier, MD, PhD,[a,c] Carlo Banfi, MD, PhD, FCCP,[a,c] André Vincentelli, MD, PhD,[a,c] Pierre-Vladimir Ennezat, MD, PhD,[b] Thierry Le Tourneau, MD, PhD,[c] Claire Pinçon, PhD,[d] and Alain Prat, MD[a,c]

Juthier et al., J Thorac Cardiovas Surg. 2010

Résultats à long terme ?



MATERIELS ET METHODES - cohorte

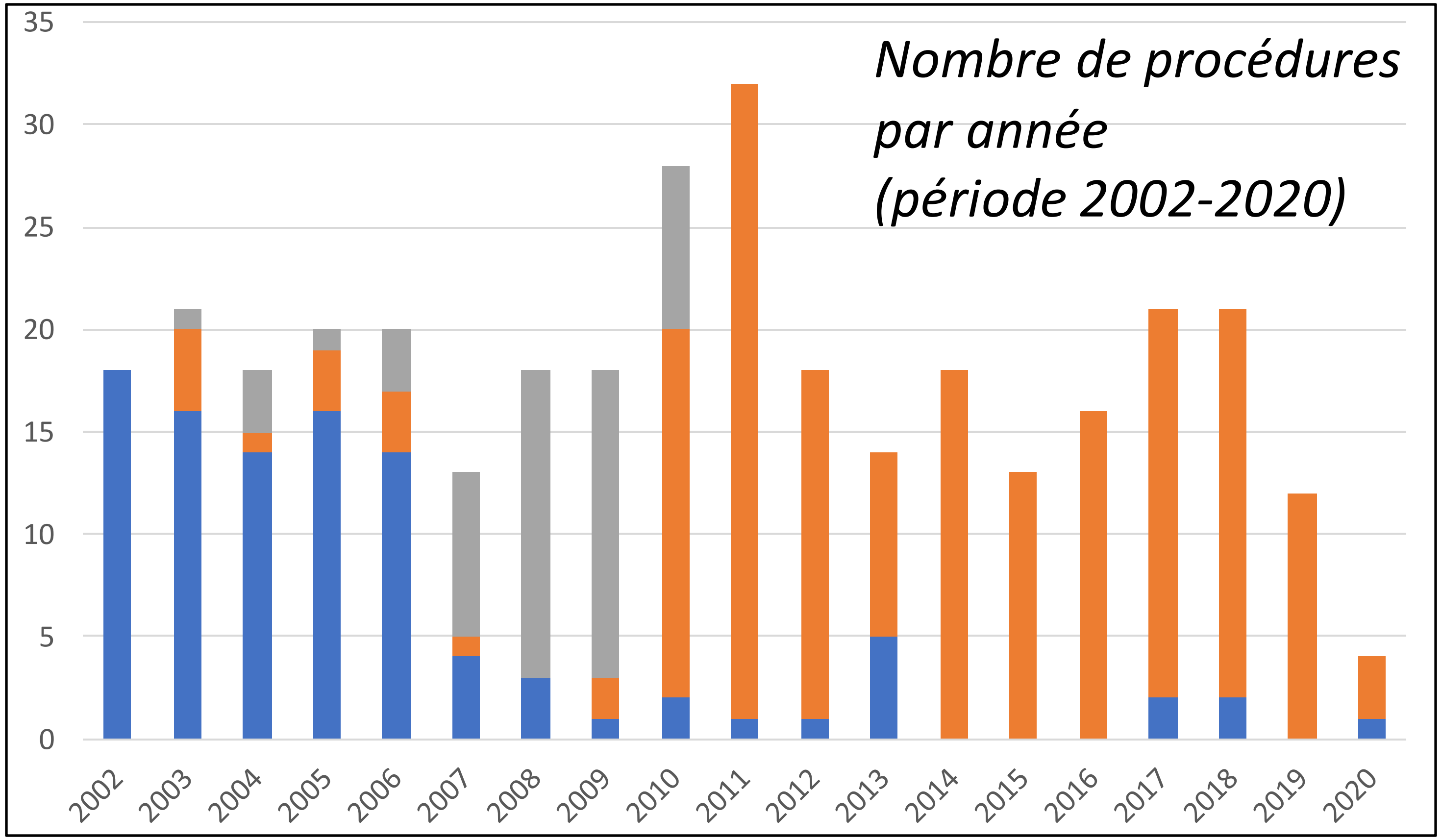
Cohorte lilloise, mars 1992 – décembre 2020 : **525 Ross**

Technique :

→ **Full-root** (1992-2020)
n = 282 (53,7%)

→ **Sous-coronaire** (2003-2010)
n = 54 (10,3%)

→ **Inclusion Valsalva** (2003-2020)
n = 189 (36,0%)

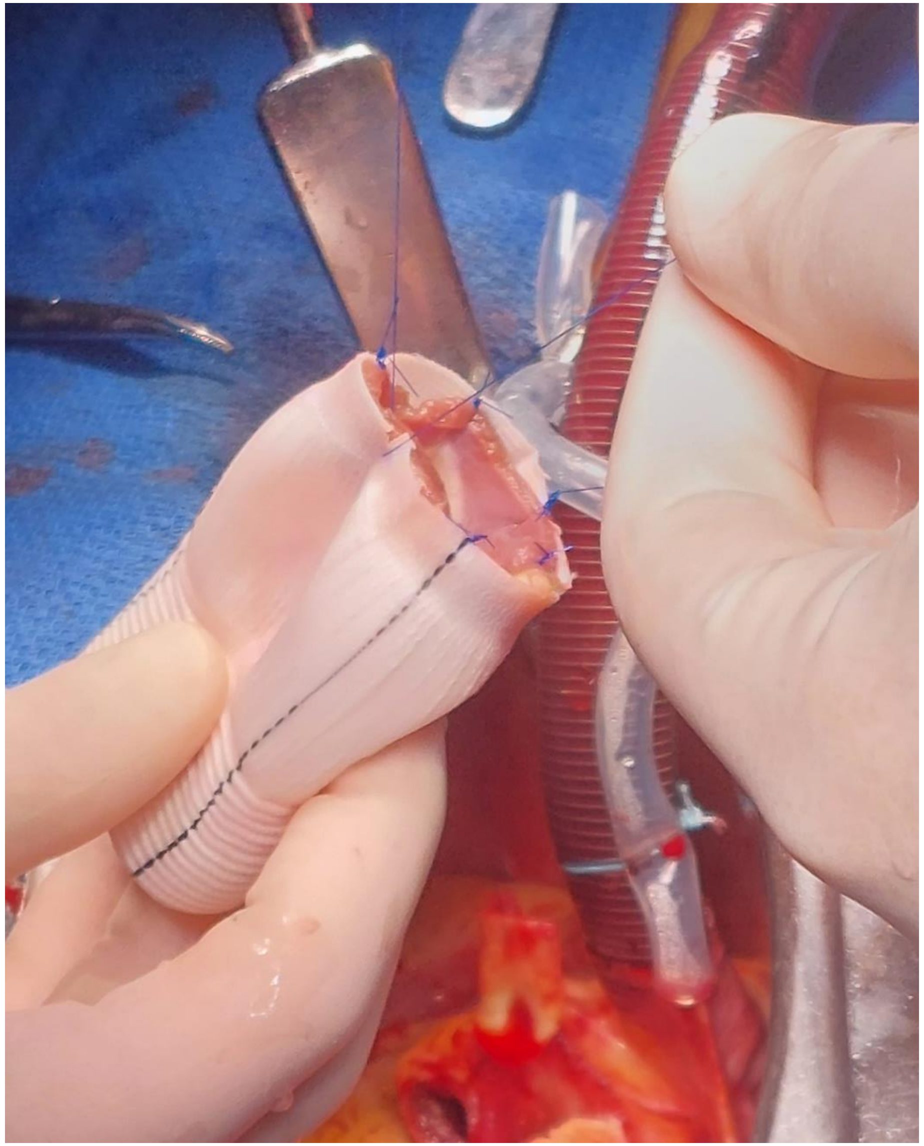


Cohorte rétrospective, n = 189

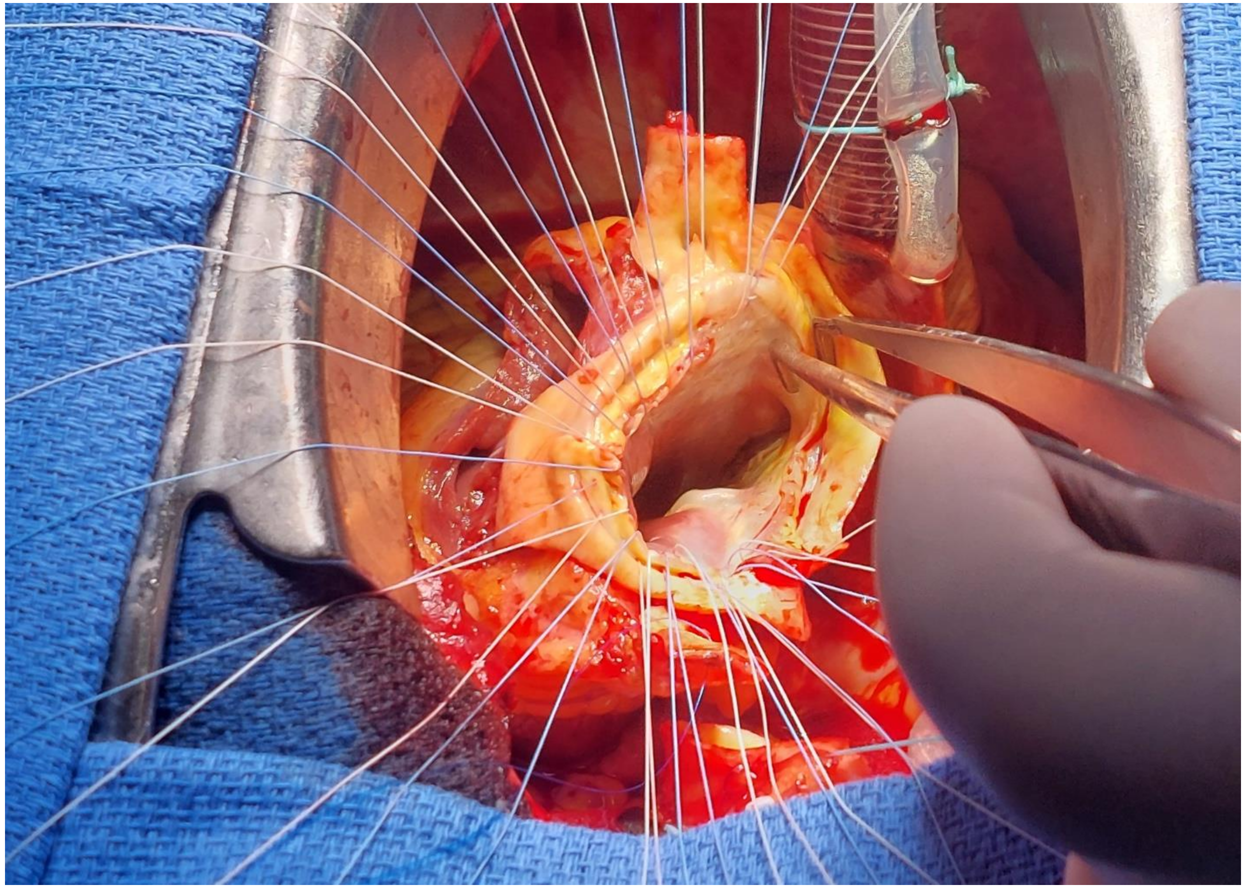
Tous inclus pour analyse

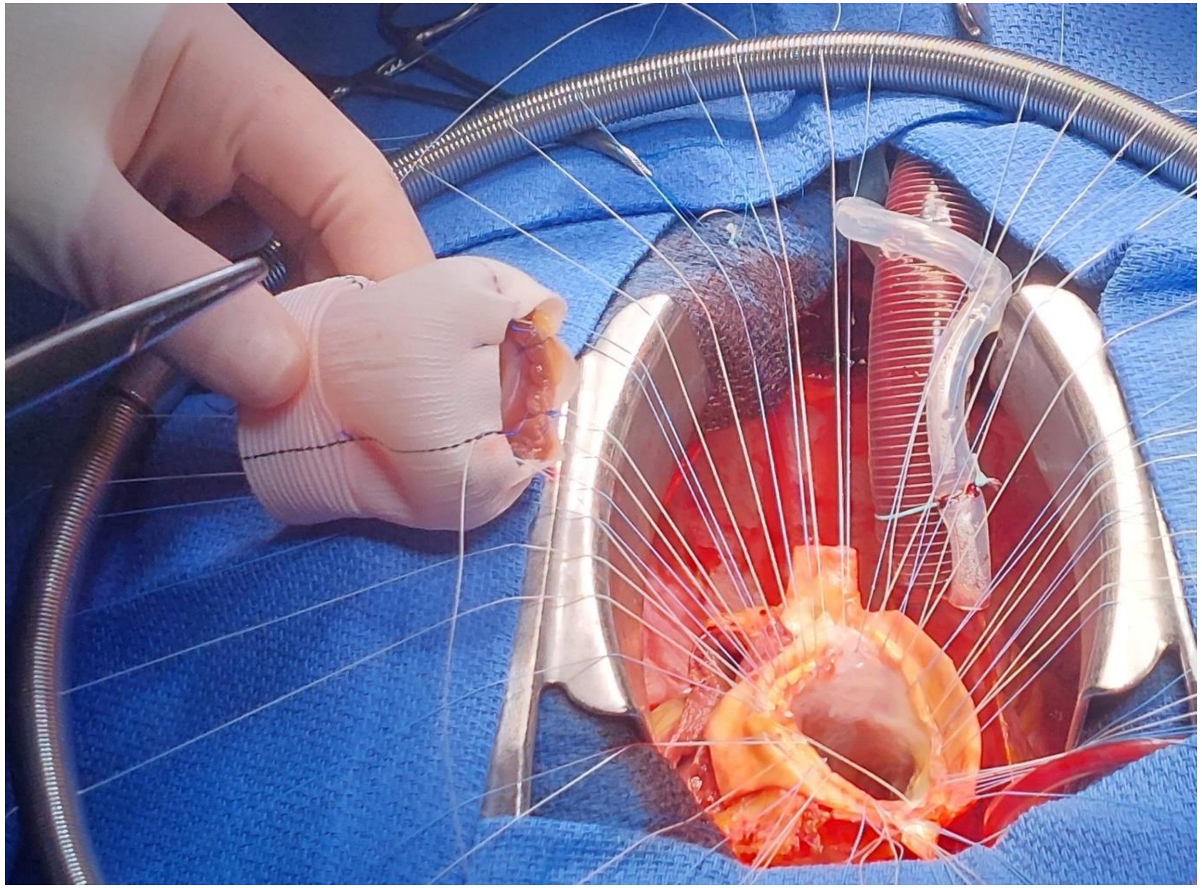
CNIL MR-004 (n°2234506), CERC SFCTCV (IRB00012919)

MATERIELS ET METHODES – technique chirurgicale

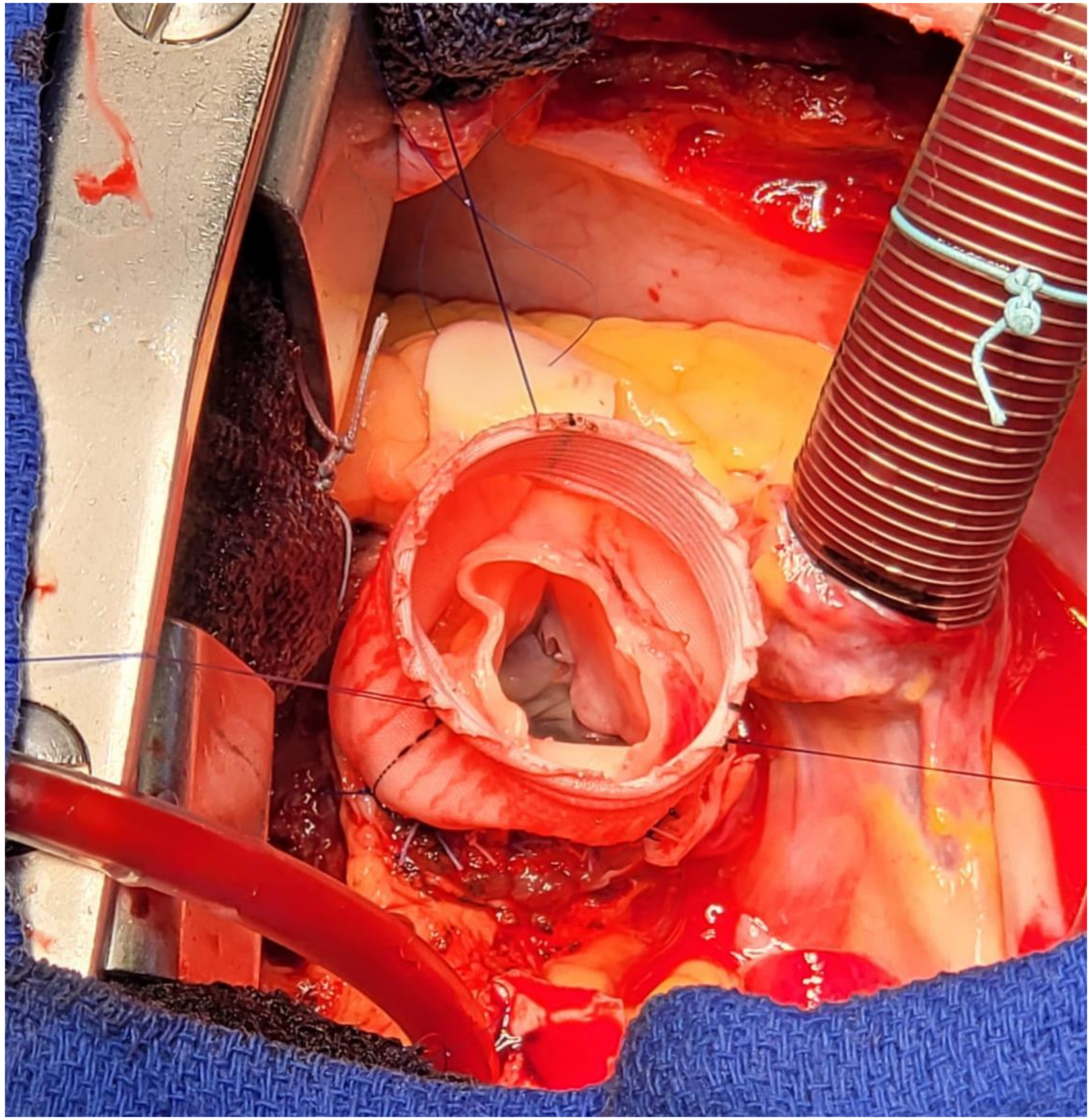


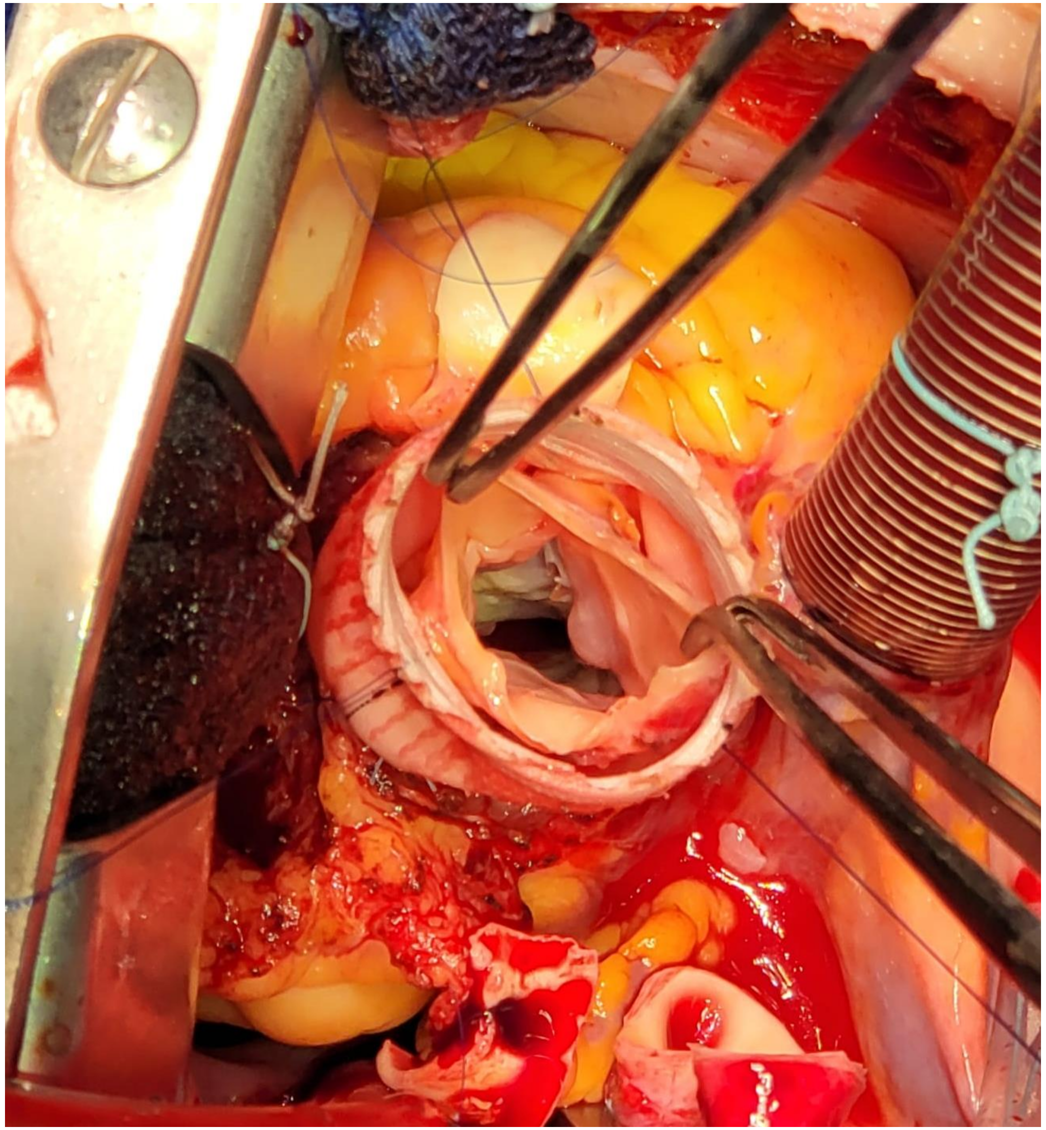
MATERIELS ET METHODES – technique chirurgicale



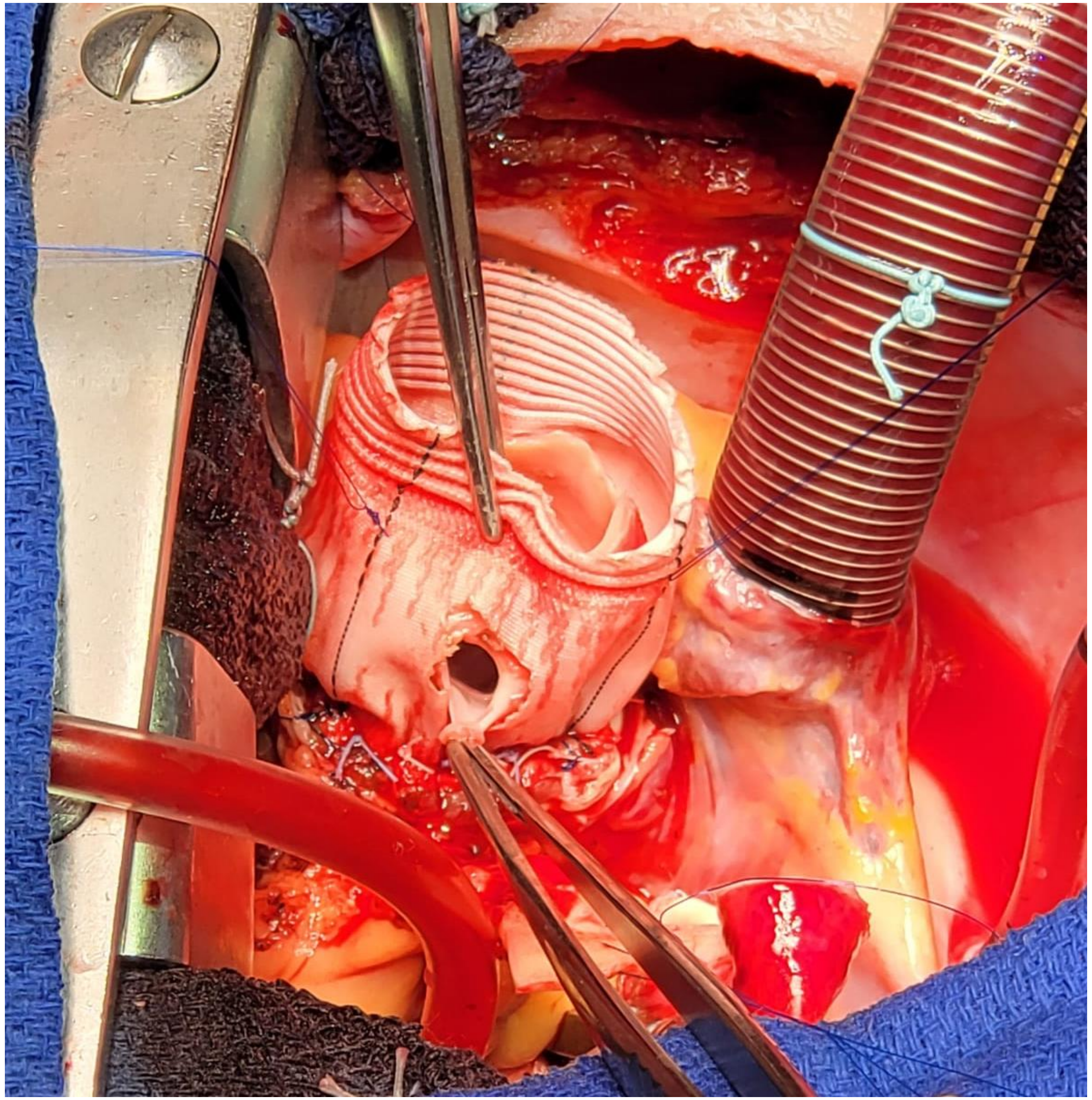


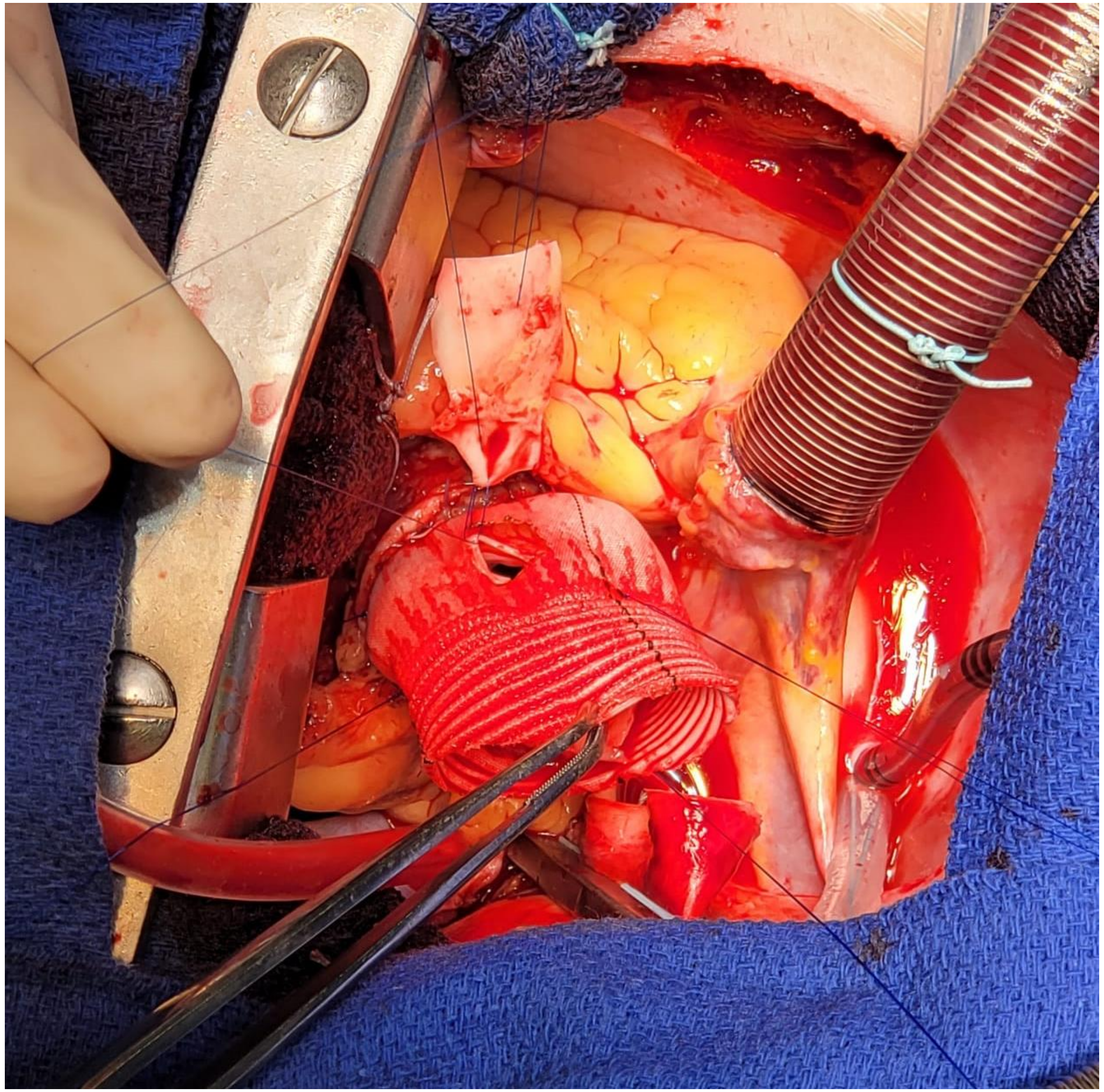
MATERIELS ET METHODES – technique chirurgicale





MATERIELS ET METHODES – technique chirurgicale





RESULTATS – préopératoire

n = 189

	Variable	Values	
Age, y			
	Median	30.9	(22.5-38.7)
	Range	11-52	
	Pediatric	20	(10.6)
Male sex		140	(74.1)
Previous intervententions			
	Previous sternotomy	22	(11.6)
	Previous aortic valve repair	13	(6.9)
	Previous balloon dilatation	12	(6.3)
Aortic valve morphology			
	Bicuspid	171	(90.5)
	Non-bicuspid	13	(6.9)
	Prosthesis	5	(2.6)
Etiology			
	Acute Endocarditis	6	(3.2)
Hemodynamic lesion			
	Pure aortic insufficiency	76	(40.2)
	Pure aortic stenosis	58	(30.7)
	Mixed lesion	50	(26.5)
	Prosthetic valve failure	5	(2.6)
Dilated ascending aorta		100	(52.9)
	Values are median (IQR) or n (%)		

RESULTATS – per-opératoire

n = 189

	Variable	Values	
Cardiopulmonary bypass duration, min		135	(120-171.5)
Cross-clamp duration, min		114	(101.5-143.5)
Diameters, mm			
	Native aortic annulus	27	(24.3-29)
	Autograft	26	(24-26)
	Valsalva graft	28	(26-30)
RVOT reconstruction			
	Cryopreserved homograft	142	(75.1)
	Freestyle	41	(21.7)
	Other	6	(3.2)
Concomitant procedures (n=102, 54.0%)			
	On ascending aorta	93	(49.2)
	Other	30	(15.9)
	Aortic annulus enlargement	4	(2.1)
	Atrial septal defect repair	4	(2.1)
	Ventricular septal defect repair	3	(1.6)
	Congenital anomalous coronary artery repair	2	(1.1)
	≥ 2 concomitant procedures	7	(3.7)
Intraoperative complications			
	Aortic reclamping	8	(4.2)
	Unplanned coronary artery bypass grafting	3	(1.6)
	Values are median (IQR) or n (%)		

RESULTATS – post-opératoire précoce

n = 189

Variable	Values
Mortality	3 (1.6)
Veinoarterial ECMO	4 (2.1)
Reexploration	7 (3.7)
For bleeding	3 (1.6)
For autograft explantation	1 (0.5)
Other cause	3 (1.6)
Pacemaker implantation	4 (2.1)
Stroke	2 (1.1)

Values are median (IQR) or n (%)

Décès précoces : 3 (1,6%)

P 63 ♀ 41 ans, tridux, Ross-Konno
2 reclampages pour hémostase
Décès J3

P 69 ♂ 30 ans, tridux
2 reclampages, pontage Cx, ECMO
Décès J5

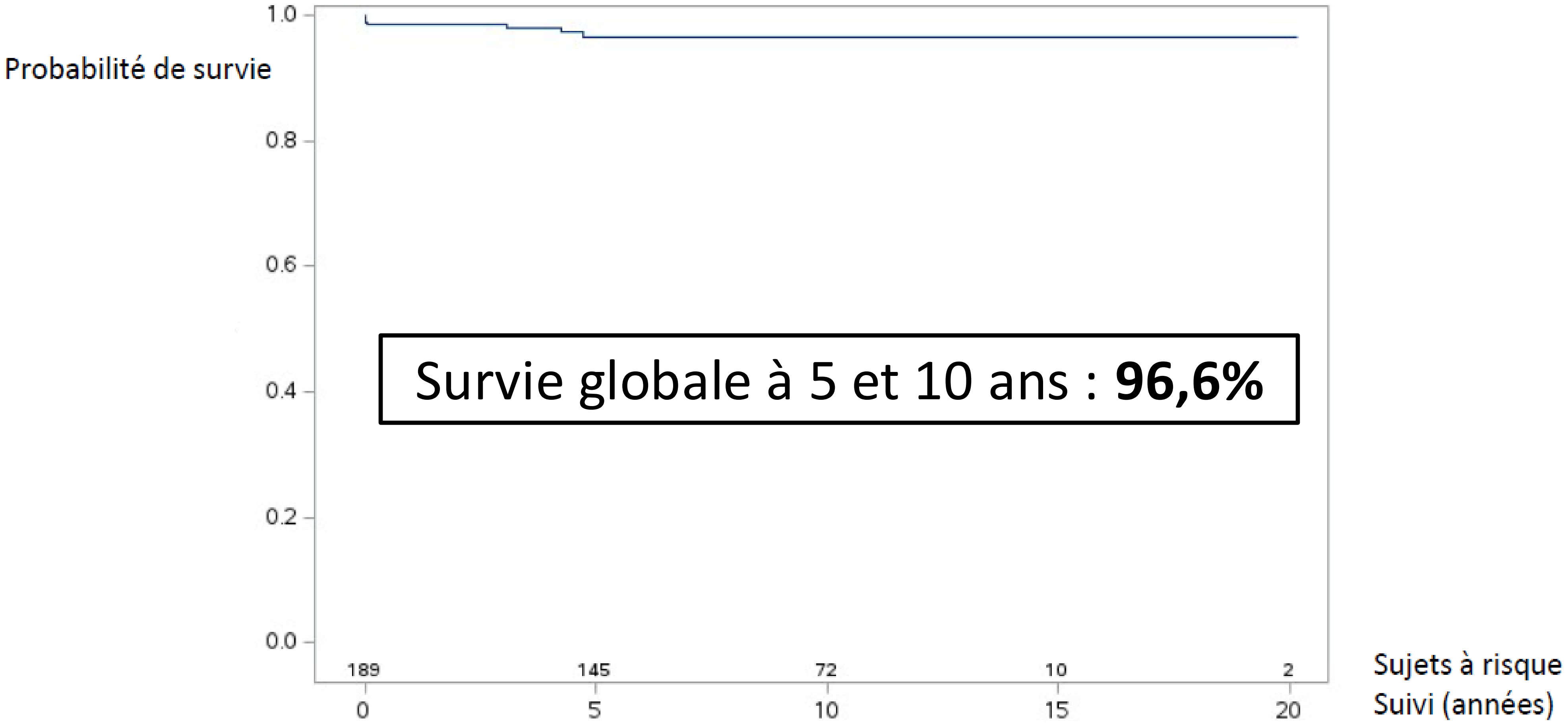
P 172 ♀ 39 ans, obèse
2 reclampages, pontages IVA-CD, ECMO
Décès J10

1 explantation précoce

P 73 Faux-anévrisme proximal septique
Bentall mécanique à J26

RESULTATS – survie

Suivi clinique médian 8,6 ans



RESULTATS – réinterventions tardives

Réinterventions tardives majeures : 13 patients, 15 procédures

Non valvulaires : 2 procédures
- Invagination auricule gauche
- Plastie mitrale pour IM

Valvulaires : 12 patients, 13 procédures

Sur la voie droite : 3 procédures
- 2 percutanées
- 1 chir concomitante

Sur l'autogreffe :
10 patients, 11 procédures

Pour IAo sévère

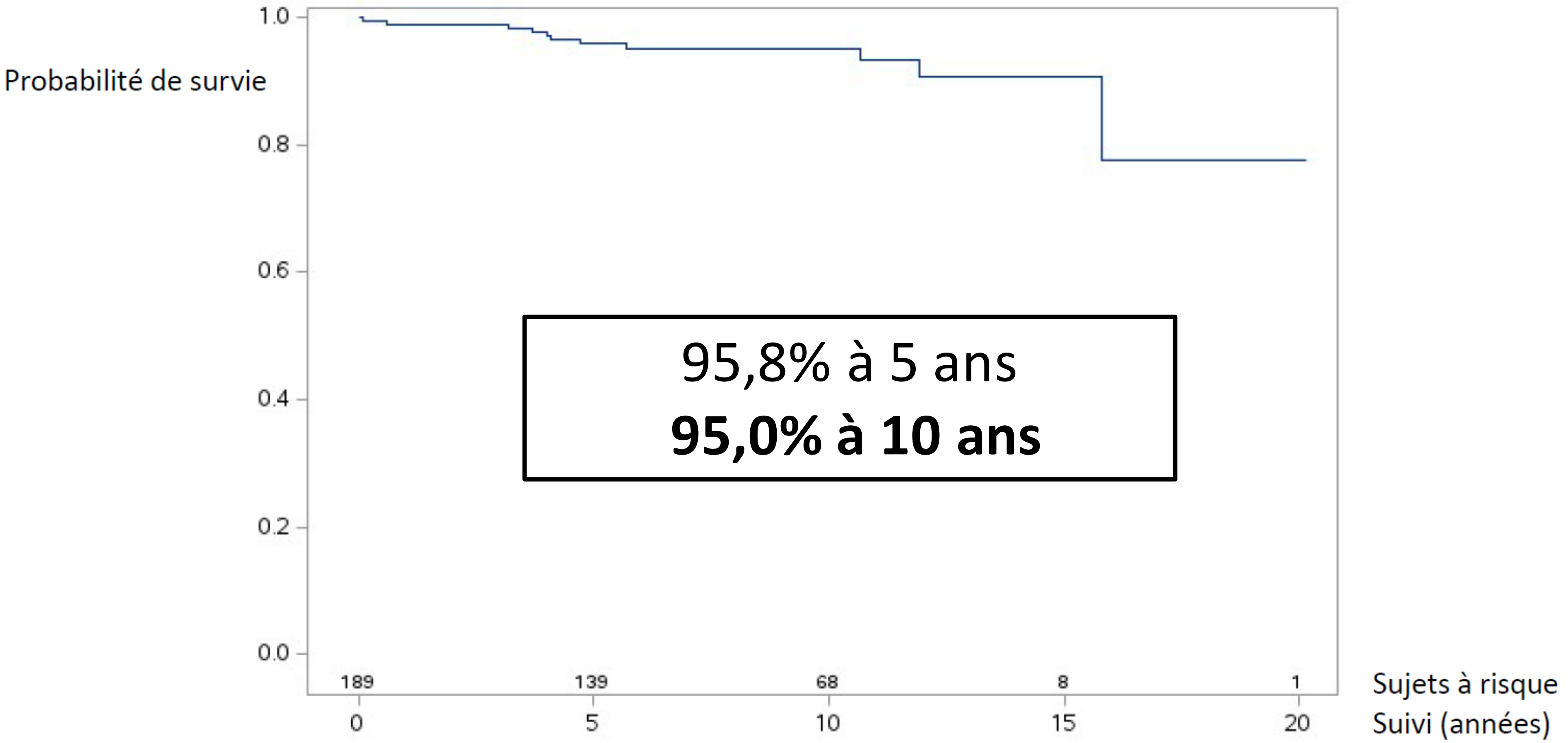
→ faux-anévrisme proximal aseptique (1 patient)

→ prolapsus de cuspide (9 patients, 10 procédures)

3 tentatives de plastie

In fine explantation (délai médian 5 ans)

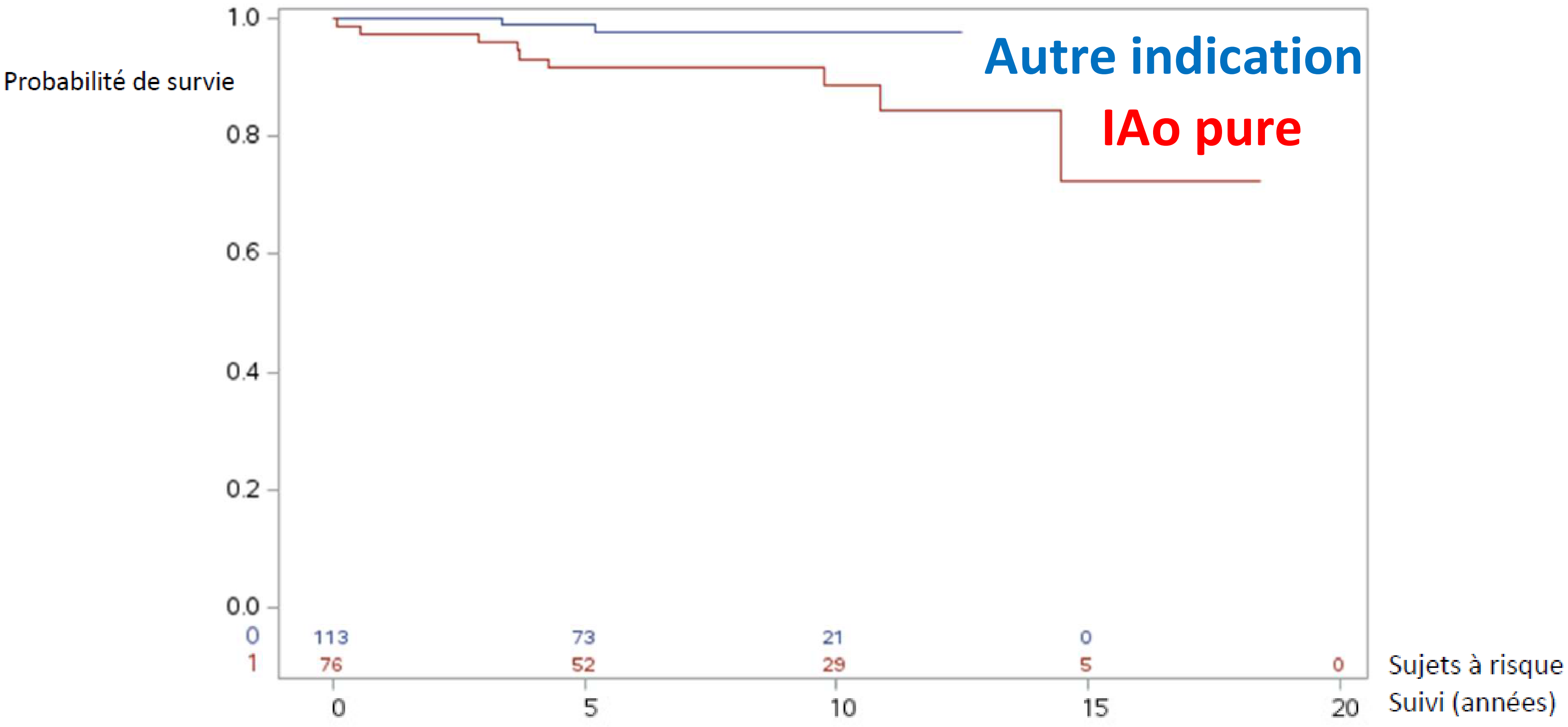
RESULTATS – survie sans réintervention



95,8% à 5 ans

95,0% à 10 ans

RESULTATS – FDR de réintervention sur l'autogreffe



→ **Anneau aortique dilaté** (HR 1,2/mm, p<0,05)

→ **IAo préopératoire** (**HR 4,9**, p<0,05)

CONCLUSION

Cohorte rétrospective monocentrique (n = 189, suivi médian 8,6 ans)

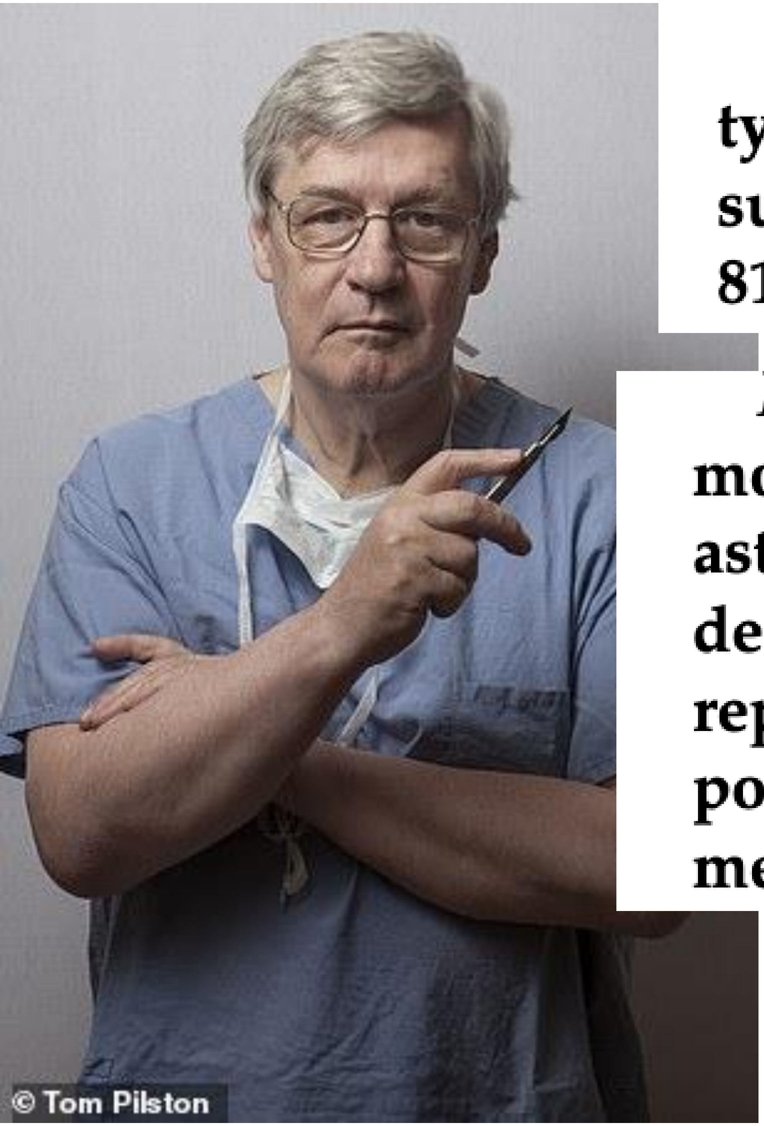
Technique sûre et reproductible

5% de réinterv sur autogreffe à 10 ans

IAo préop et anneau ao dilaté

Poursuite du suivi dans la 2ème décennie

Chirurgie des syndromes aortiques aigus



Methods. Between 1988 and December 2000, 95 acute type A dissection patients were operated on by one surgeon. They included 70 men and 25 women aged 37 to 81 years (mean 65 years). Six had Marfan syndrome.

Results. Five patients died in hospital (5.3% 30-day mortality) and another after early readmission for mediastinal infection (6.3% total mortality). There were no deaths from bleeding. Two patients required aortic valve replacement for aortic regurgitation 2.5 and 3.0 years postoperatively. Two others required total arch replacement and thromboexclusion procedures, respectively.

tients had ascending aortic replacement with glue resuspension of the valve. Two others had had aortic valve replacement previously. Aortic root and partial arch replacement was performed in 6 Marfan patients. Eigh-

vative "pathology-oriented" approach helps to achieve this aim.

(Ann Thorac Surg 2002;73:707–13)

JOURNAL OF THE AMERICAN COLLEGE OF CARDIOLOGY
VOL. 76, NO. 14, 2020

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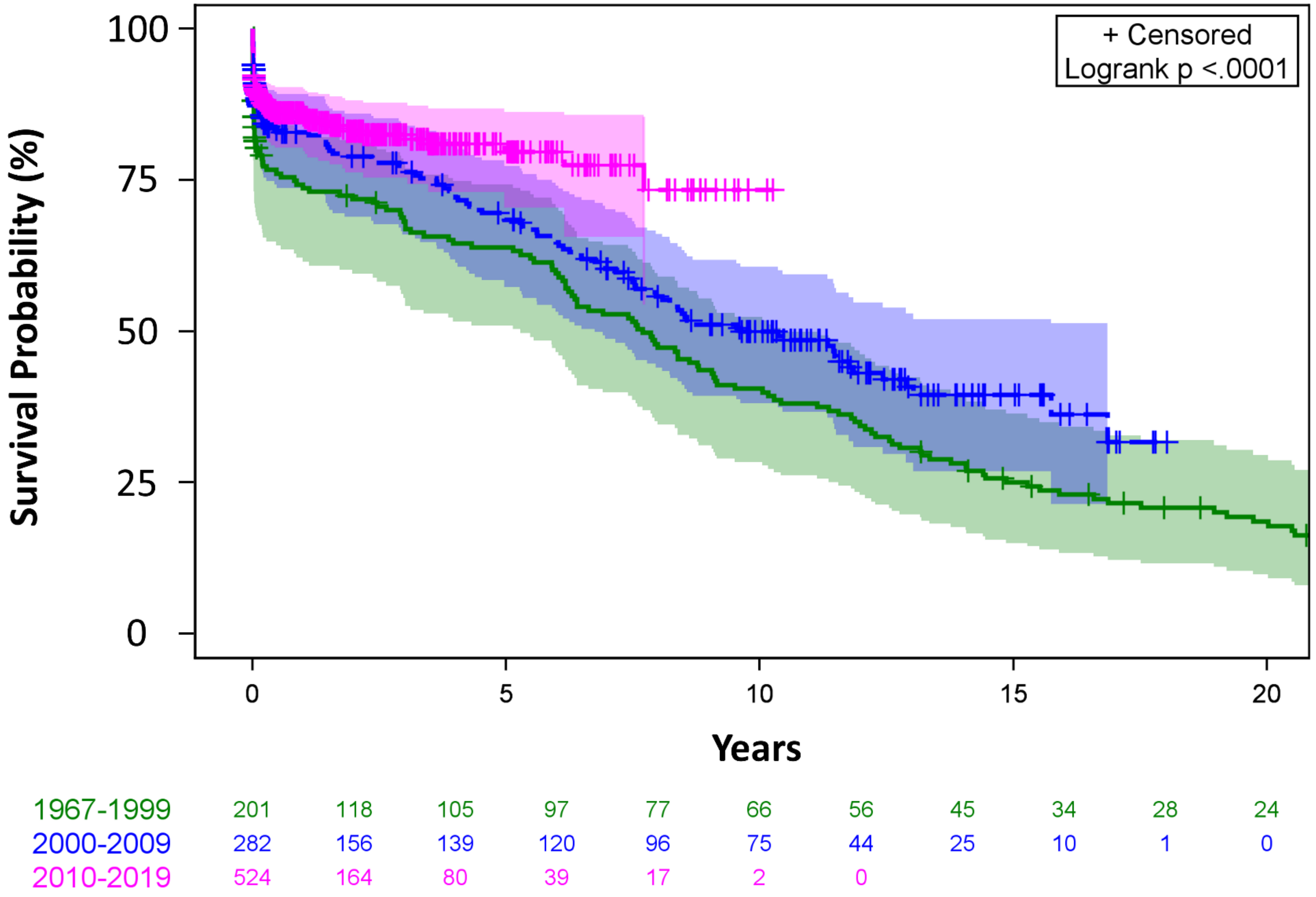
JACC HISTORICAL BREAKTHROUGHS IN PERSPECTIVE

Type A Aortic Dissection—Experience Over 5 Decades

JACC Historical Breakthroughs in Perspective

Yuanjia Zhu, MD,[a] Bharathi Lingala, PhD,[a] Michael Baiocchi, PhD,[b] Jacqueline J. Tao, BS,[c] Veronica Toro Arana, BS,[c] Jason W. Khoo, BA,[c] Kiah M. Williams, BA,[c] Abd Al-Rahman Traboulsi, BS,[c] Hilary C. Hammond, MMS, PA-C,[a] Anson M. Lee, MD,[a] William Hiesinger, MD,[a] Jack Boyd, MD,[a] Philip E. Oyer, MD, PhD,[a] Edward B. Stinson, MD,[a] Bruce A. Reitz, MD,[a] R. Scott Mitchell, MD,[a] D. Craig Miller, MD,[a] Michael P. Fischbein, MD, PhD,[a] Y. Joseph Woo, MD[a]


+ Censored
Logrank p <.0001
Survival Probability (%)
100
75
50
25
0
0
5
10
15
20
Years
1967-1999 201 118 105 97 77 66 56 45 34 28 24
2000-2009 282 156 139 120 96 75 44 25 10 1 0
2010-2019 524 164 80 39 17 2 0

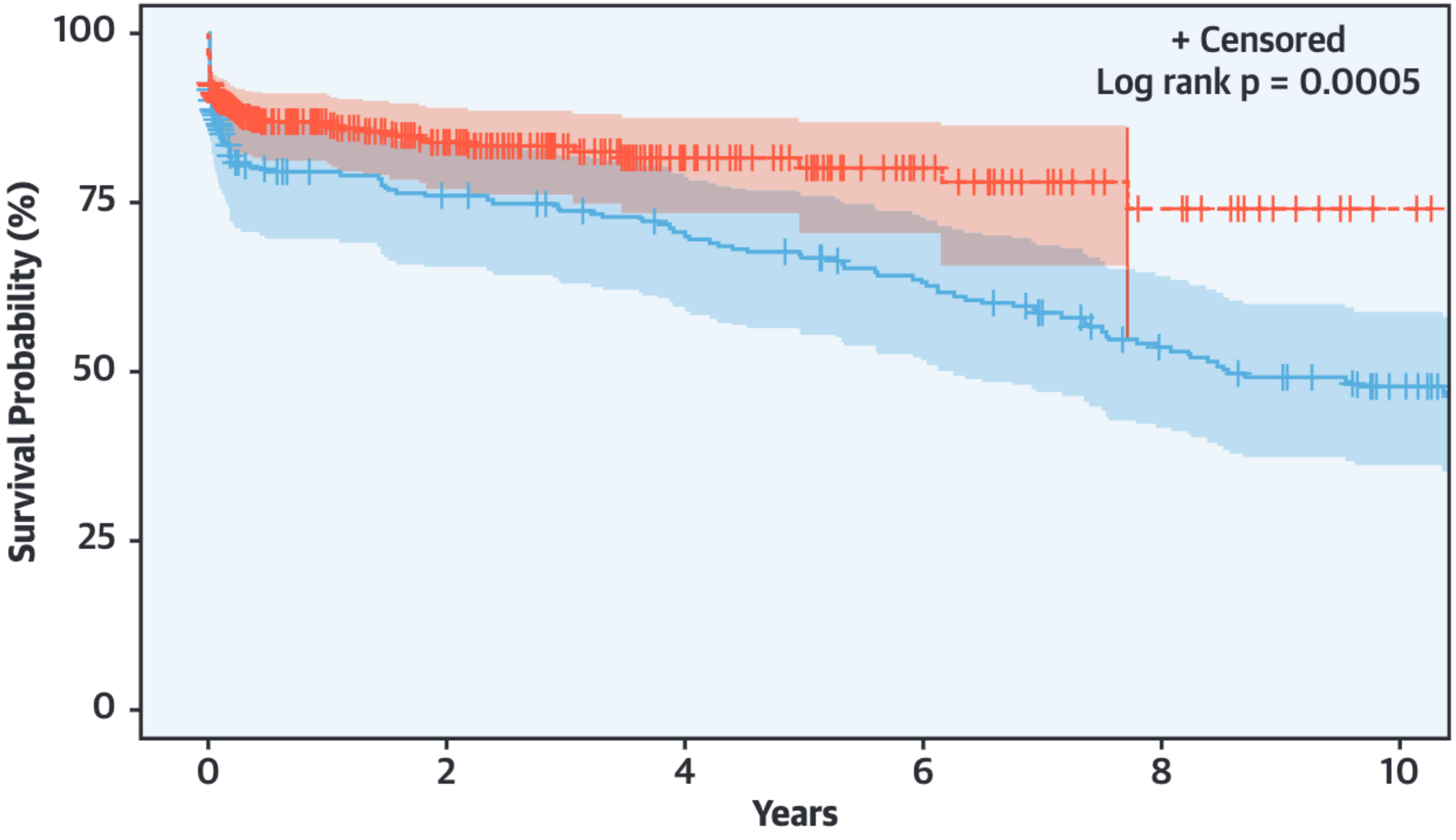
Mortalité opératoire

- **Early area:**
  - **1967-1992: 26%**

- **Middle area:**
  - **2000-2009: 12.6%**

- **Modern area**
  - **2010-2019 : 9.4%**

CENTRAL ILLUSTRATION **Kaplan-Meier Survival Analyses After the Application of Stabilized Inverse Probability Weighting Comparing Patients Who Underwent Surgery in 2000 to 2009 Versus 2010 to 2019**



2000-2009	282.3	156.2	148.3	141.5	132.5	125.5	115.2	103.1	90.5	82.0	70.1
2010-2019	523.7	219.7	166.1	117.9	83.4	63.3	40.5	27.6	18.9	9.0	2.3

Zhu, Y. et al. J Am Coll Cardiol. 2020;76(14):1703-13.

Patients who underwent acute type A aortic dissection (ATAAD) repair in 2010 to 2019 demonstrated superior survival compared with those who underwent ATAAD repair in 2000 to 2009 (p = 0.0005). **Shaded area** = 95% confidence interval.

En 2023, quelle stratégie ?

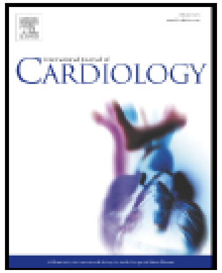
Aorte Proximale

International Journal of Cardiology 184 (2015) 285–290

Contents lists available at ScienceDirect

International Journal of Cardiology

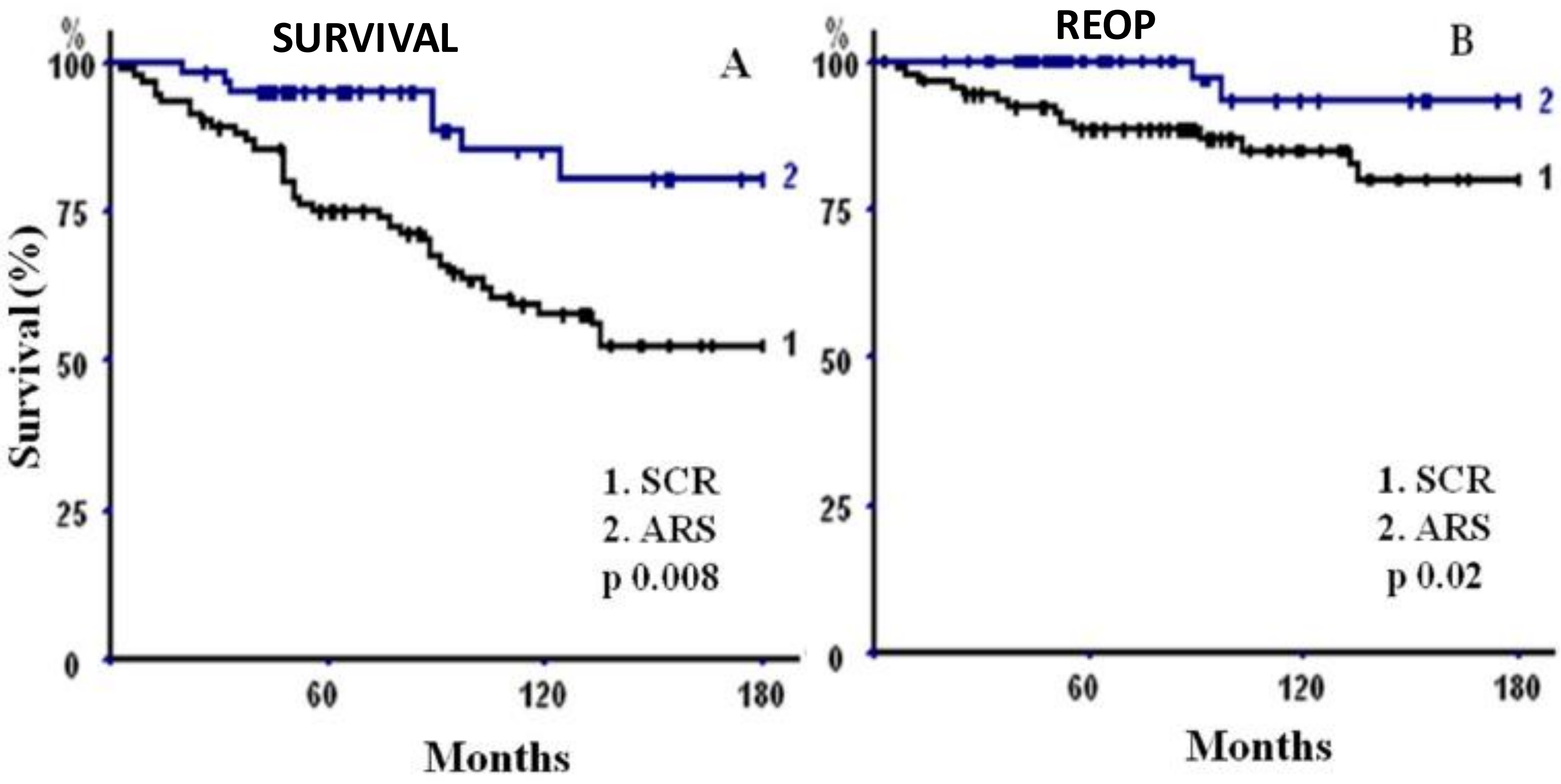
journal homepage: www.elsevier.com/locate/ijcard



Aortic root surgery improves long-term survival after acute type A aortic dissection☆

Ilir Hysi [a], Francis Juthier [a], Olivier Fabre [b], Olivier Fouquet [c], Natacha Rousse [a], Carlo Banfi [a], Claire Pinçon [d], Alain Prat [a], André Vincentelli [a,*]

[a] *Centre Hospitalier Régional et Universitaire de Lille, Lille 59035, Department of Cardiovascular Surgery, France*
[b] *Centre Hospitalier de Lens et Hôpital privé de Bois Bernard, Lens, Department of Cardiac surgery, France*
[c] *Centre Hospitalier Universitaire d'Angers, Angers 42000, Department of Cardiovascular and Thoracic surgery, France*
[d] *Université Lille Nord de France, Lille 59000, UDSL, EA2694, Department of Biostatistics, France*



Patients at risk

SCR	68	39	23	67	39	23
ARS	42	18	13	42	21	14

Multivariate Cox analysis of factors affecting event-free survival.

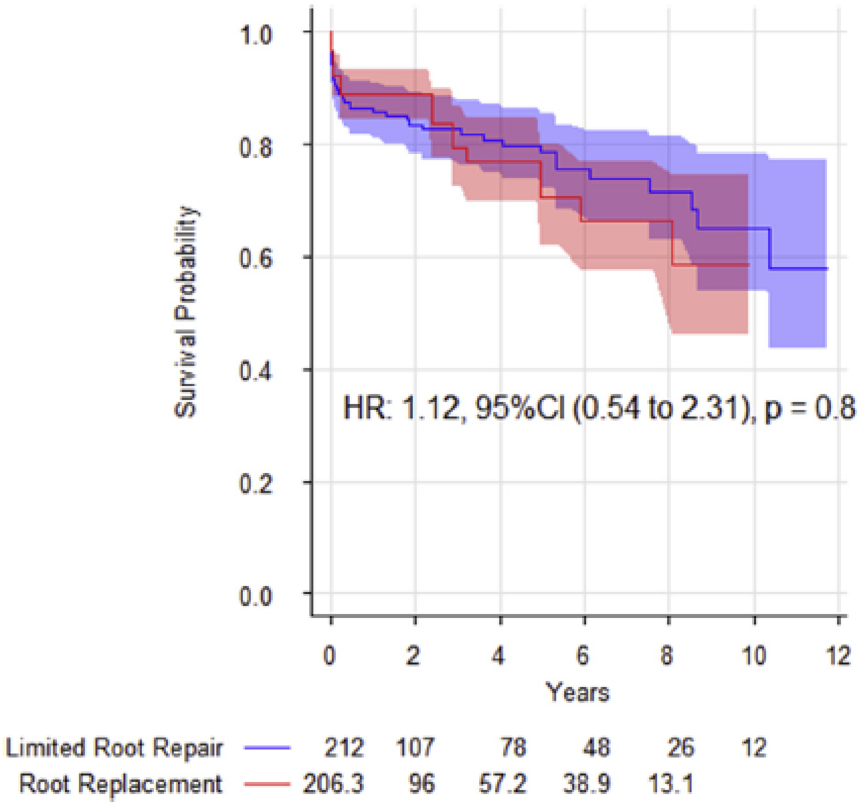
Multivariate analysis			
Variable	OR	CI 95%	p value
ARS	0.393	[0.206–0.748]	0.005
Sex: female	0.462	[0.243–0.878]	0.02
Preoperative peripheral malperfusion	3.110	[1.203–8.040]	0.02

ACQUIRED: AORTA

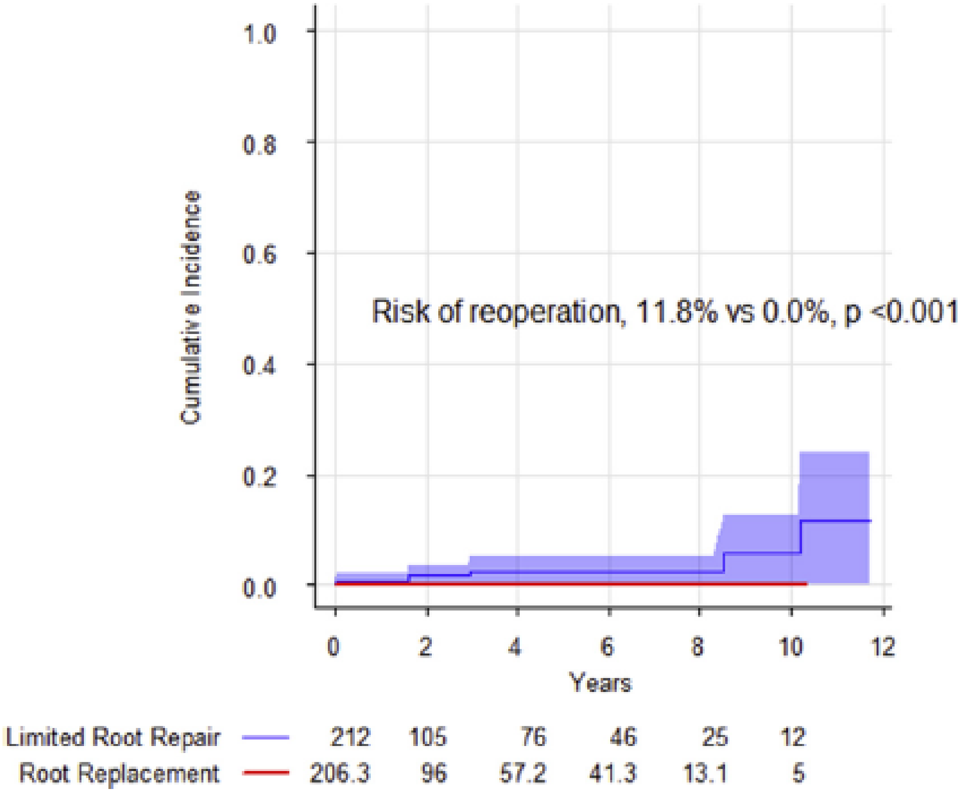
Limited root repair in acute type A aortic dissection is safe but results in increased risk of reoperation

Peter Chiu, MD, MS,[a,b] Jeffrey Trojan, BA,[a] Sarah Tsou, BA,[a] Andrew B. Goldstone, MD, PhD,[a,b] Y. Joseph Woo, MD,[a] and Michael P. Fischbein, MD, PhD[a]

The Journal of Thoracic and Cardiovascular Surgery • January 2018



Survival Probability
1.0
0.8
0.6
0.4
0.2
0.0
HR: 1.12, 95%CI (0.54 to 2.31), p = 0.8
0 2 4 6 8 10 12
Years
Limited Root Repair 212 107 78 48 26 12
Root Replacement 206.3 96 57.2 38.9 13.1



Cumulative Incidence
1.0
0.8
0.6
0.4
0.2
0.0
Risk of reoperation, 11.8% vs 0.0%, p <0.001
0 2 4 6 8 10 12
Years
Limited Root Repair 212 105 76 46 25 12
Root Replacement 206.3 96 57.2 41.3 13.1 5

Aorte Distale

Matériel et méthodes

Patients opérés d'une dissection aortique de type A

CHU Lille

01/01/1990

CH Lens

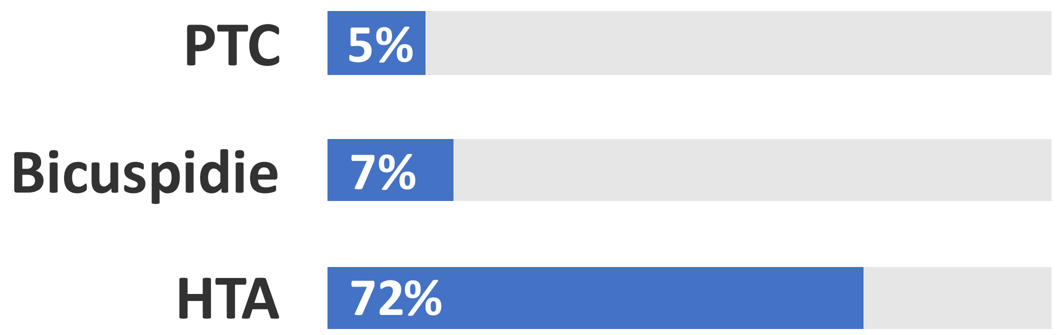
31/12/2016

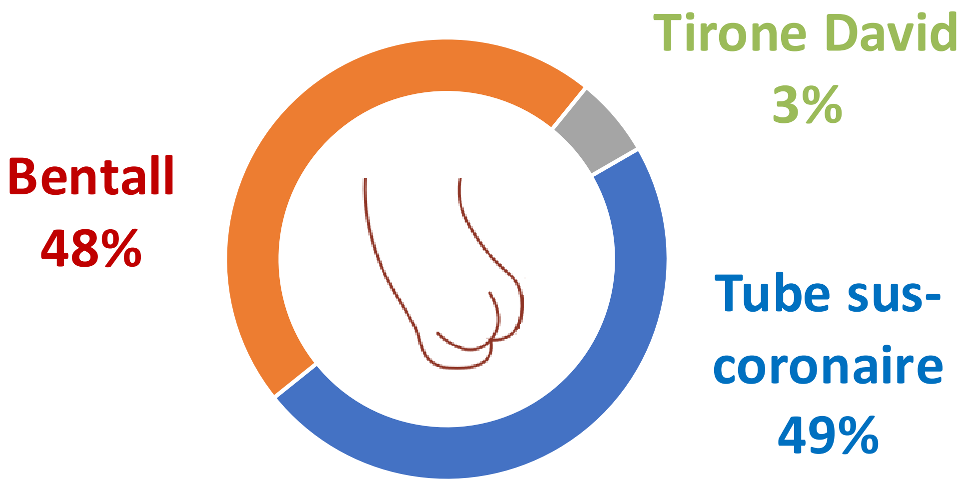
Résultats : population et geste

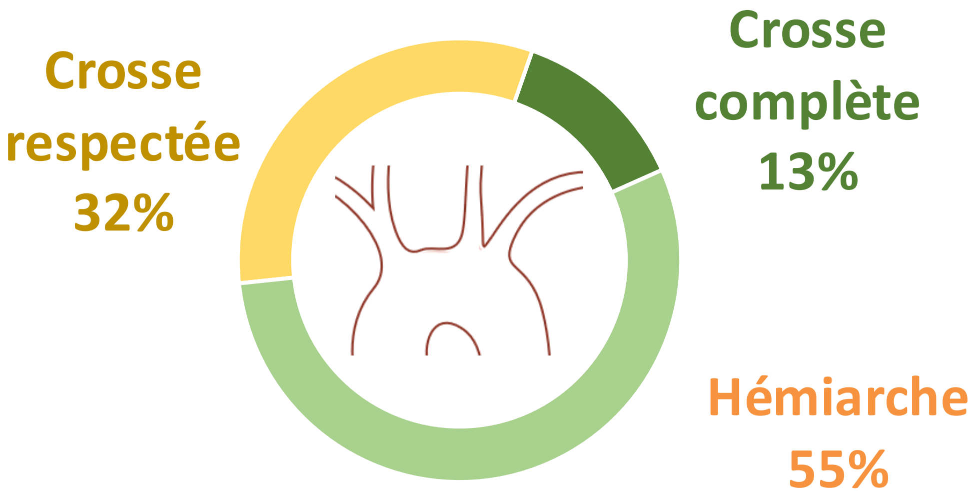
360 patients

65 % d'hommes

Age médian = 60 ans







Mortalité opératoire

25% | **Décès avant J30**

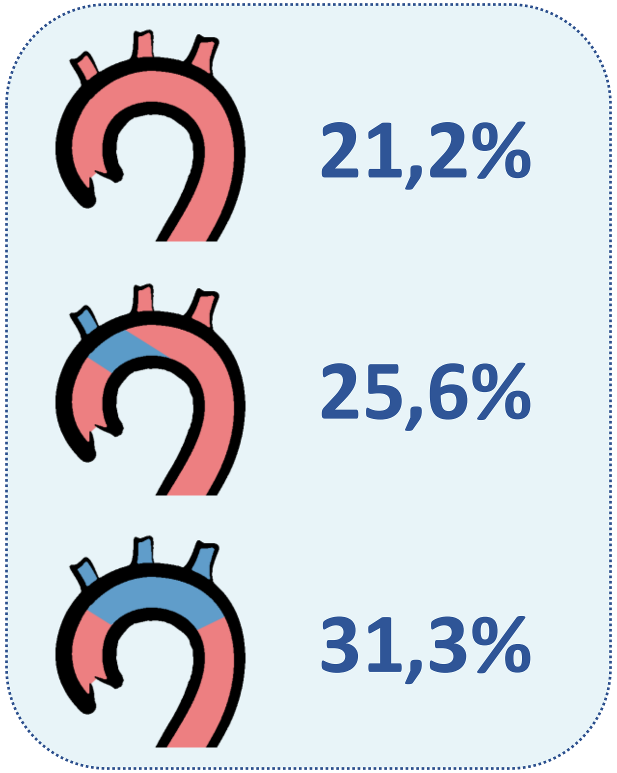
- **Facteurs prédictifs de décès liés au patient**

Age par année	RR=1,05 ; p<0,0001
Ischémie périph pré-op	RR=2,24 ; p=0,03
IDM pré-op	RR=2,66 ; p=0,002
Etat de choc pré-op	RR=1,865 ; p=0,01

- **Facteurs prédictifs de décès liés à l'intervention**

Tube sus-coronaire	RR=2,29 ; p=0,002
Durée de clampage (par min)	RR=1,013 ; p<0,0001

Mortalité opératoire selon le geste sur la crosse



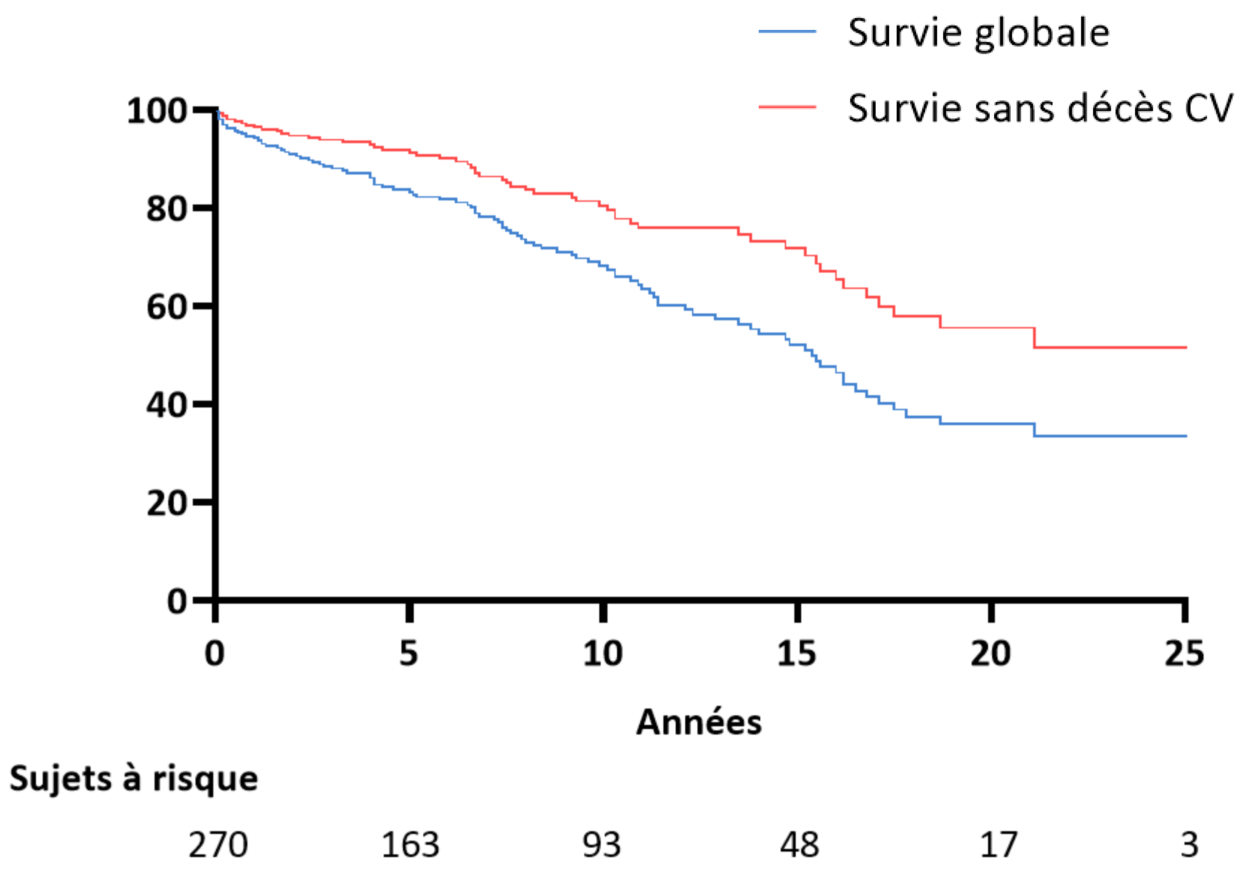
p > 0,05

Survie au long terme

Suivi médian = **10,7 ans**
Perdus de vue = **4,2%**

Survie globale corrigée
94% à 1 an ; 83% à 5 ans
68% à 10 ans

44% de décès d'origine cardiovasculaire

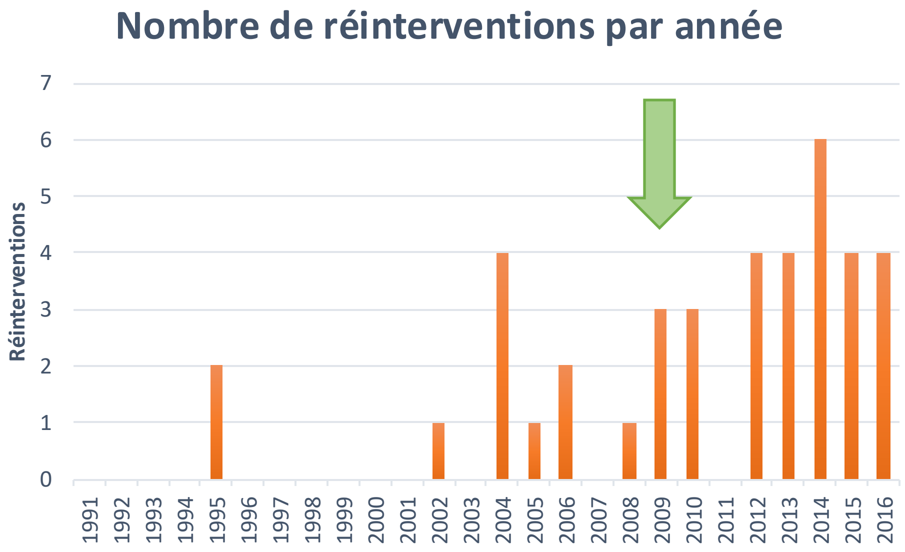


Tube sus-coronaire (RR=2,368 ; p=0,02)

Evolution des réinterventions

A partir de 2009 : mise en place d'un suivi multidisciplinaire et systématique de ces patients.

- Dépistage et traitement de l'HTA, du SAOS etc.
- Bilan cardiologique complet et surveillance scanographique
- Centralisation des informations Optimisation de la PEC



Réinterventions tardives sur l'aorte distale

9,6%

Soit 26 patients

- **39** réinterventions distales
- **27,5 m** délai médian primo - RI
- **70%** pour évolution anévrysmale
- **32,6%** des patients atteints de PTC

N = 270

Réinterventions sur l'aorte distale

39
réinterventions

20

Endovasculaire

Crosse = **3**
Crosse + ATD = **1**
ATD = **13**
Abdominale = **3**

3 décès soit 15%
2 évènements neuro

19

A ciel ouvert

Crosse = **9**
Crosse + ATD = **1**
ATD = **2**
ATD + abdominale = **2**
Abdominale = **5**

4 décès soit 21%
2 évènements neuro

Réinterventions sur l’aorte distale

14
crosses

Endovasculaire

4 réinterventions

1 décès

1 évènement neuro

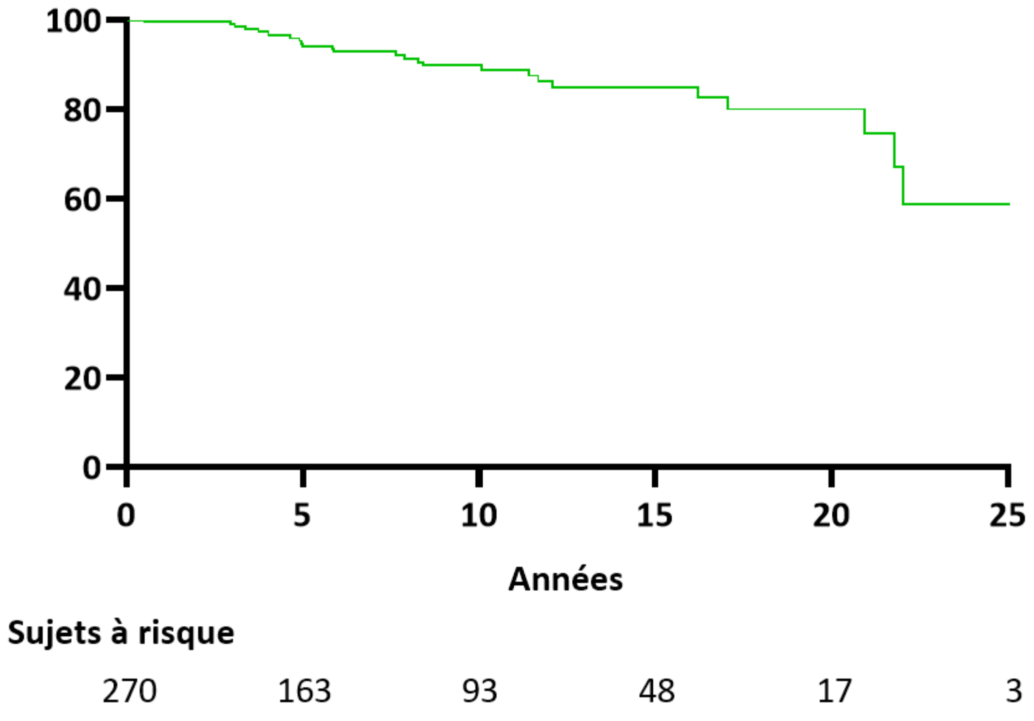
A ciel ouvert

10 réinterventions

7,1% de morbidité neurologique

7,1% de mortalité

Réinterventions sur l'aorte distale



Survie sans RI distale :

- à 1 an = 99,6%
- à 5 ans = 94,2%
- à 10 ans = 89,8%

Facteurs influençant le risque de RI

⊖ **Age** (RR = 0,96 par an ; p = 0,006)

⊕ **PTC** (RR = 4,53 ; p = 0,001)

Le remplacement de la crosse n'influençait pas le risque de RI distale.

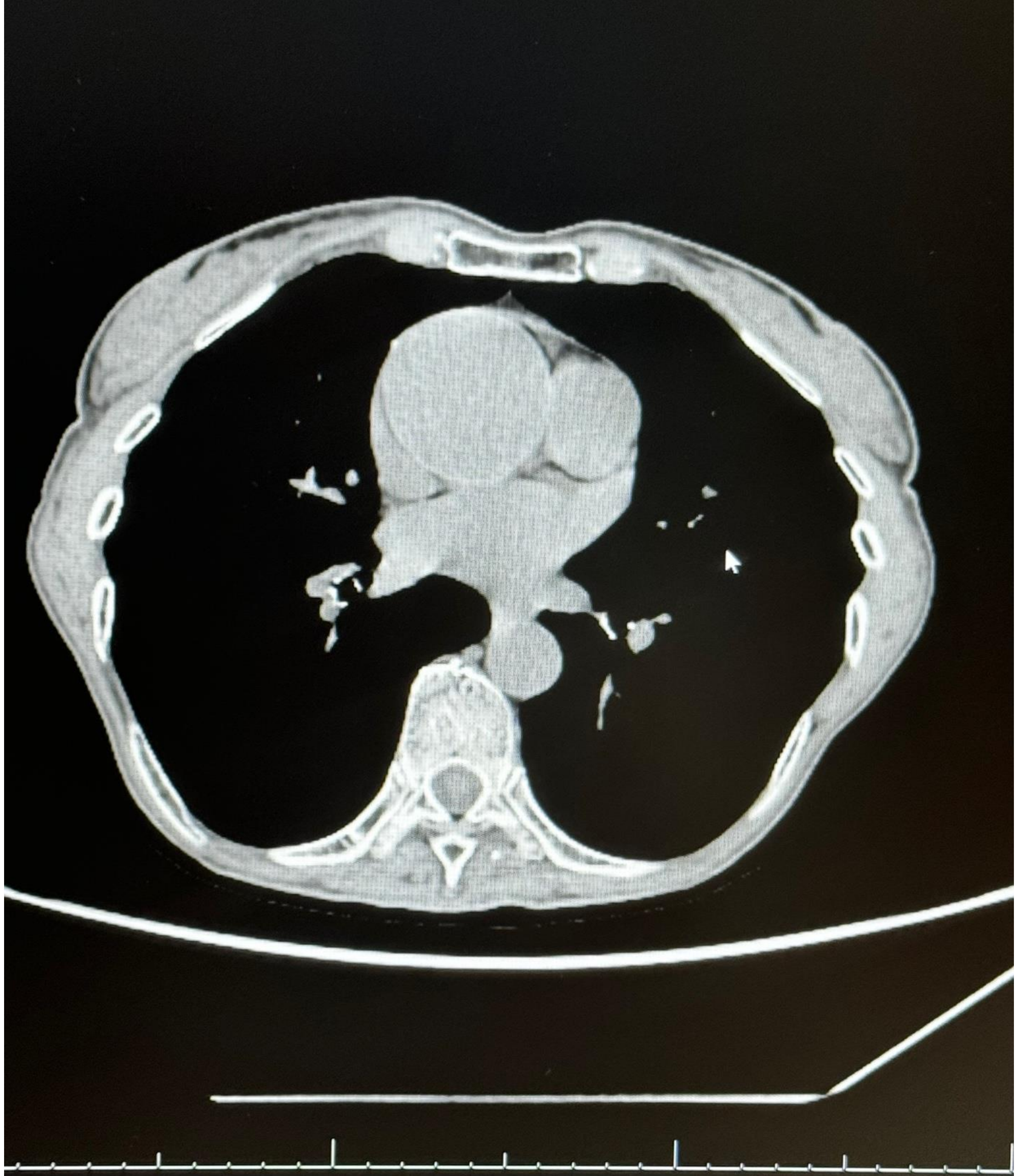
- **Population suivie**

- **Faible taux de ré-intervention**

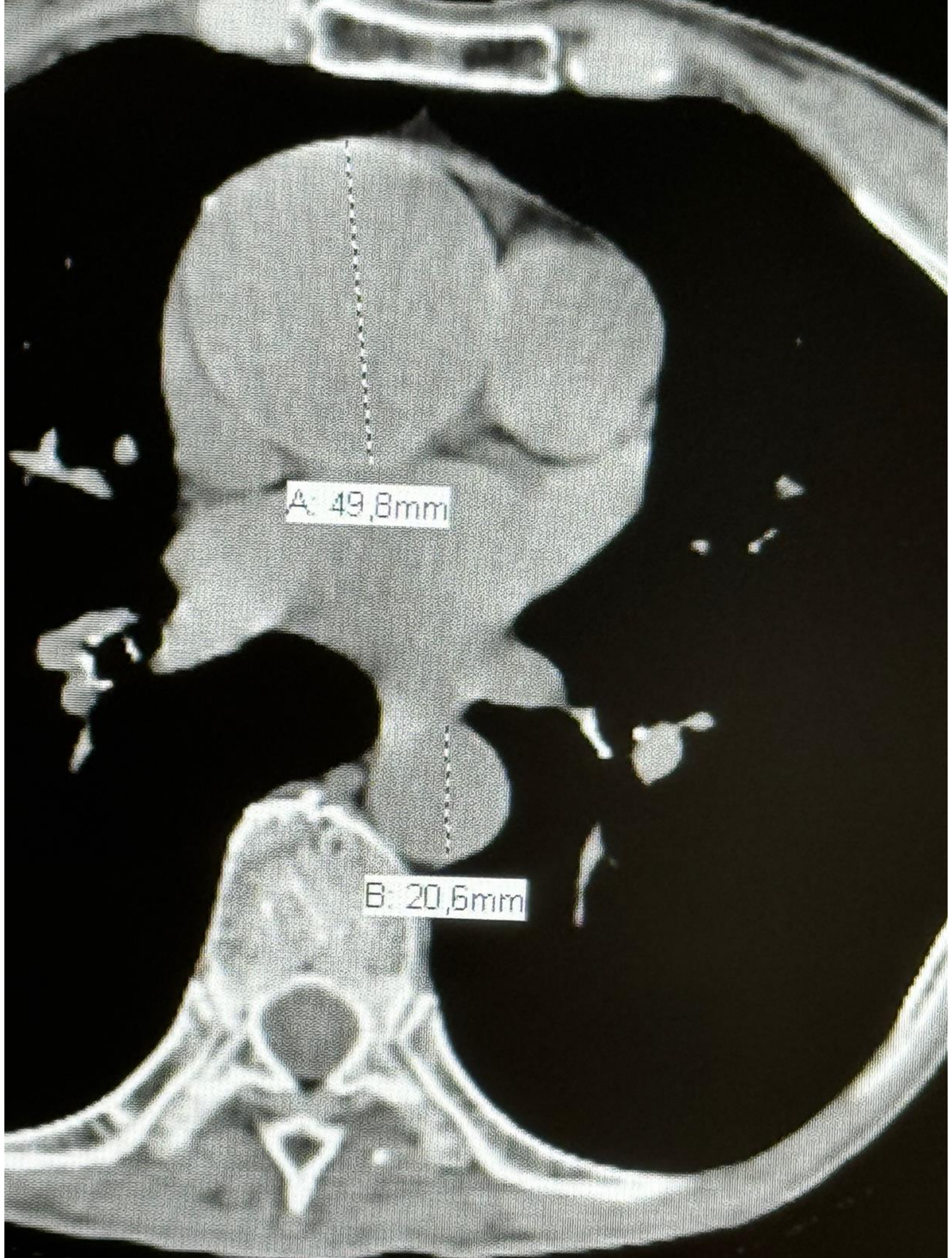
- **Chirurgie en condition programmée**

- **Survie à 10 ans de 89% sans ré-intervention**

- **Femme 70 ans, HTA, 1m77, 54 kg**
- **Découverte fortuite dilatation Aorte Ascendante segment 1**
- **Valve aortique semble tricuspide**



HTA
Sao/Taille : 10,9 cm²/m
Aorte ascendante > 2 Aorte descendante



« Take home messages »

- **50 mm**
  - **42-45 mm : « syndromiques »;**
  - **surface aortique/ taille (>10cm^2/m) ; Diam Ao/SC (>2,5cm/m$^{2)}$**

- **Chirurgie conservatrice de la racine dans les formes « simples »**

- **Adulte jeune : intérêt du Ross modifié**

- **Dissection aortique, Hématome disséquant**
  - **Chirurgie de la racine et hémi-arche**
  - **Suivi « à vie » des patients**


Merci !