

Operative Korrektur der Aortenstenose

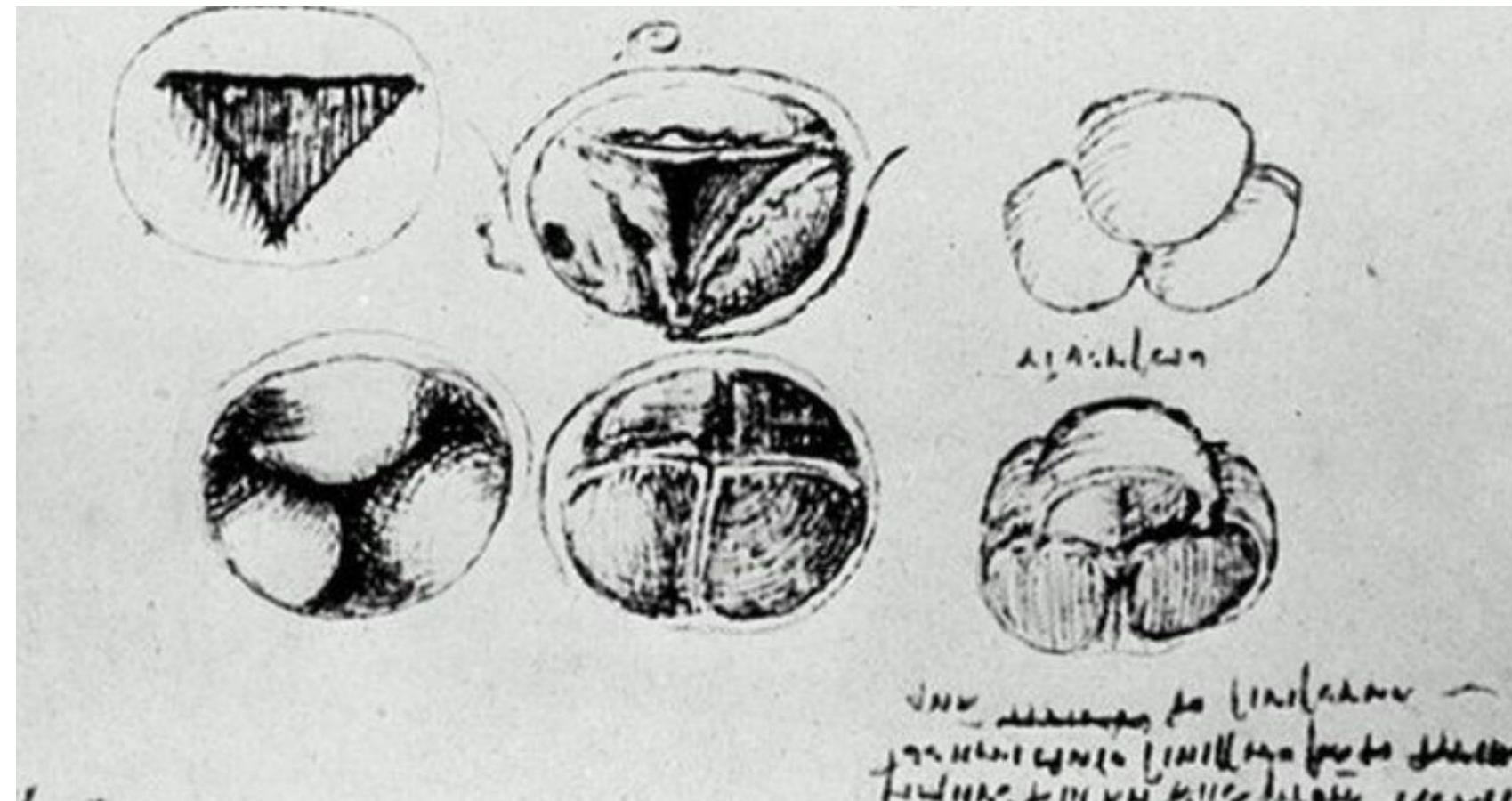
Univ. Prof. Martin ANDREAS, MBA, PhD, MEBCTS, FESC

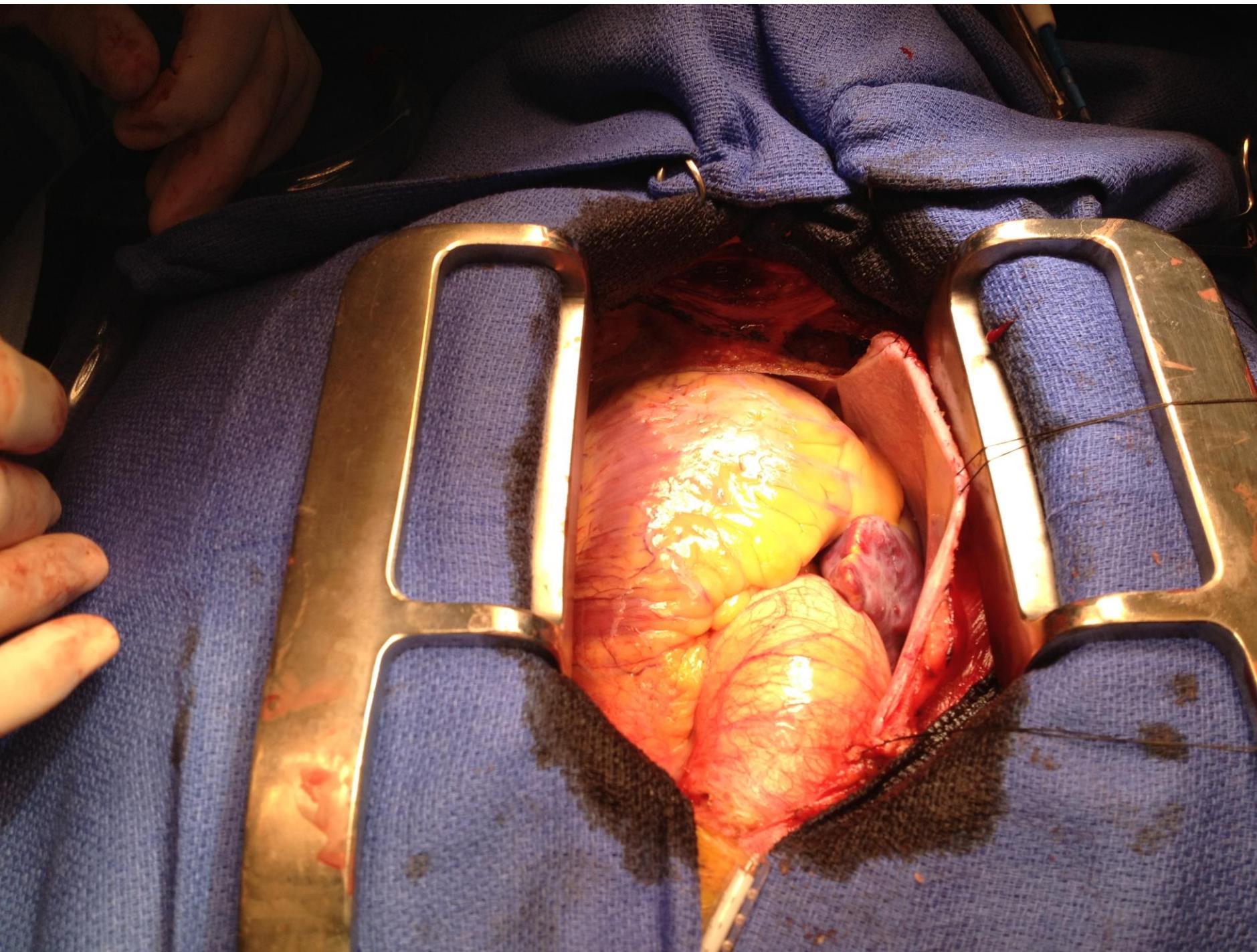
Zentrum für kardiovaskuläre Medizin

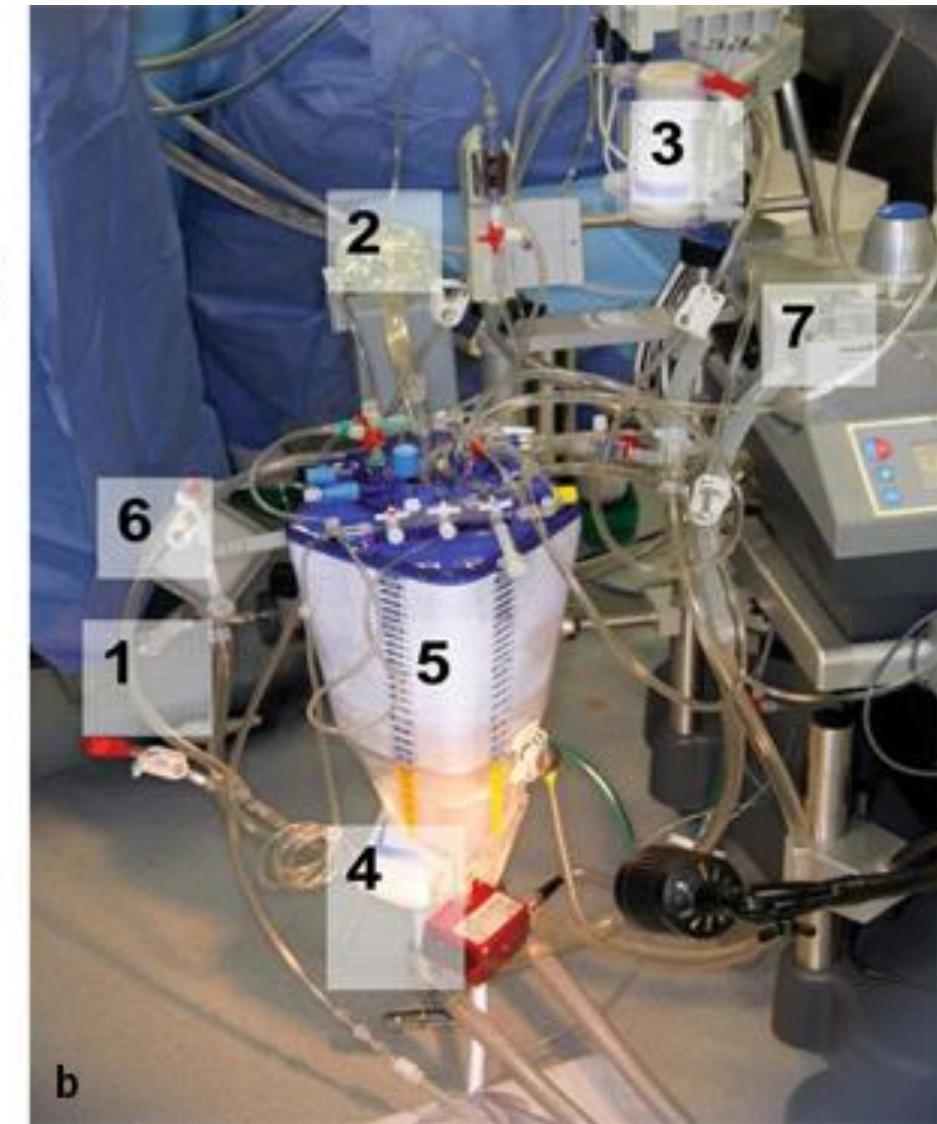
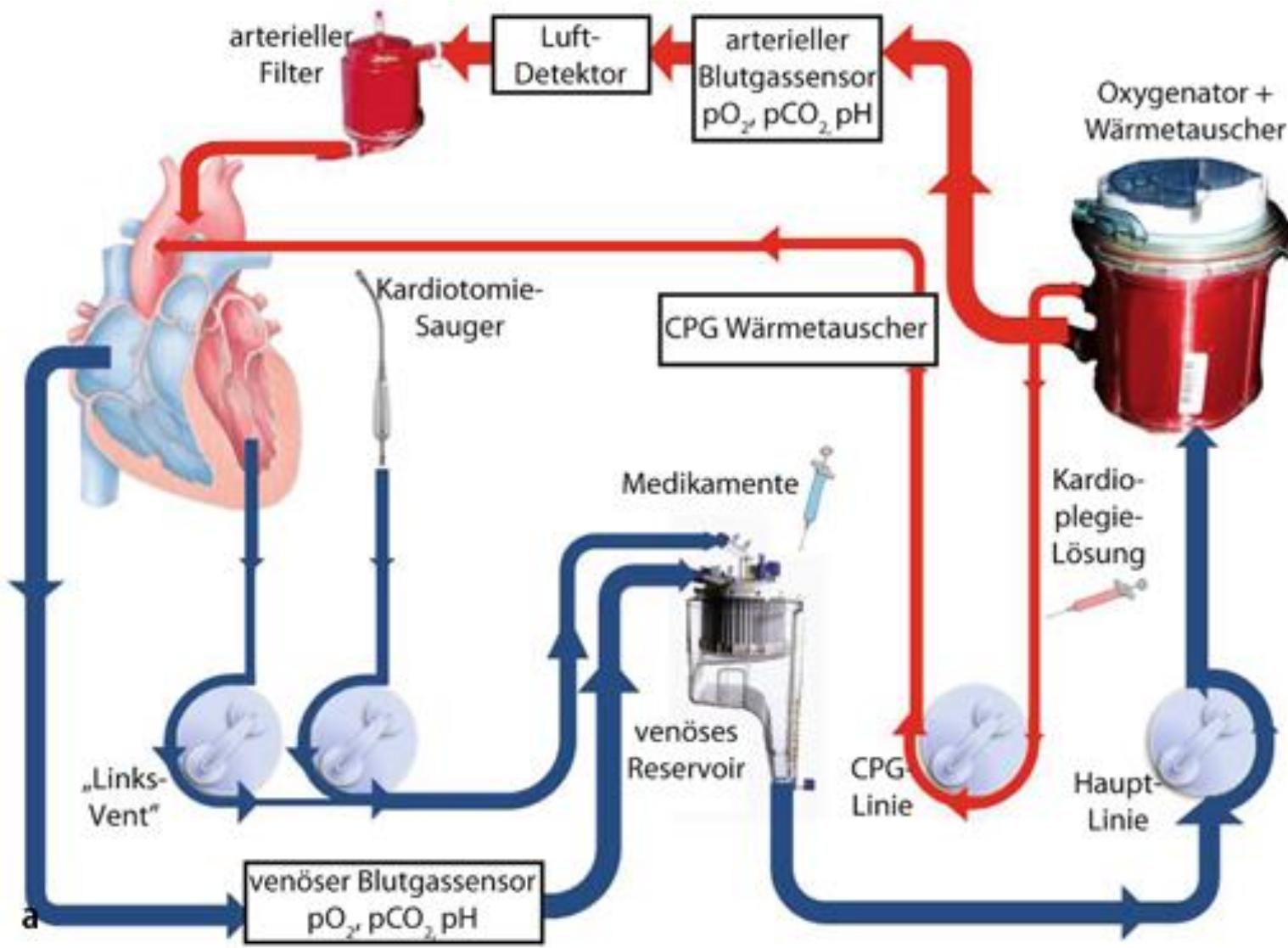
Medizinische Universität Wien

Surgical Innovation in Heart Valve Therapy

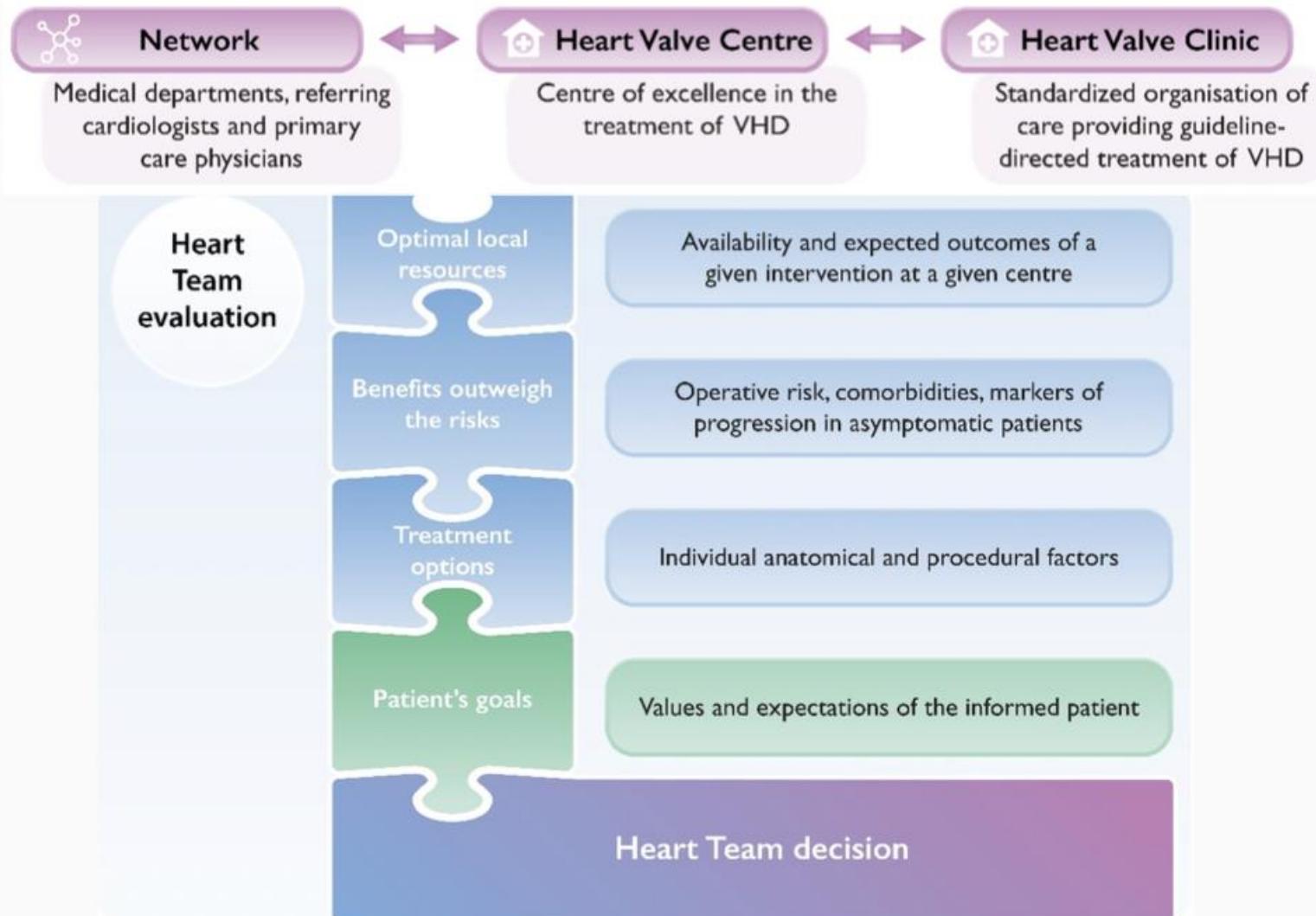
In the RENAISSANCE....







Patient-centred evaluation for intervention



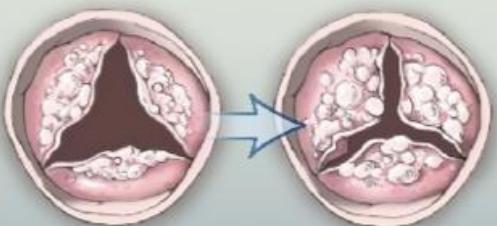
ESC / EACTS Guidelines 2021 → Early Indication

A) Symptomatic aortic stenosis	Class^b	Level^c	B) Asymptomatic patients with severe aortic stenosis	
Intervention is recommended in symptomatic patients with severe, high-gradient aortic stenosis [mean gradient ≥ 40 mmHg, peak velocity ≥ 4.0 m/s, and valve area ≤ 1.0 cm ² (or ≤ 0.6 cm ² /m ²)]. ^{235,236}	I	B	Intervention is recommended in asymptomatic patients with severe aortic stenosis and systolic LV dysfunction (LVEF <50%) without another cause. ^{9,238,239}	I
Intervention is recommended in symptomatic patients with severe low-flow (SVi ≤ 35 mL/m ²), low-gradient (<40 mmHg) aortic stenosis with reduced ejection fraction (<50%), and evidence of flow (contractile) reserve. ^{32,237}	I	B	Intervention is recommended in asymptomatic patients with severe aortic stenosis and demonstrable symptoms on exercise testing.	I
Intervention should be considered in symptomatic patients with low-flow, low-gradient (<40 mmHg) aortic stenosis with normal ejection fraction after careful confirmation that the aortic stenosis is severe ^d (<i>Figure 3</i>).	IIa	C	Intervention should be considered in asymptomatic patients with severe aortic stenosis and systolic LV dysfunction (LVEF <55%) without another cause. ^{9,240,241}	IIa
Intervention should be considered in symptomatic patients with low-flow, low-gradient severe aortic stenosis and reduced ejection fraction without flow (contractile) reserve, particularly when CCT calcium scoring confirms severe aortic stenosis.	IIa	C	Intervention should be considered in asymptomatic patients with severe aortic stenosis and a sustained fall in BP (>20 mmHg) during exercise testing.	IIa

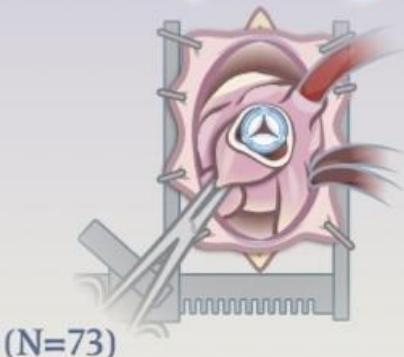
Early Surgery or Conservative Care for Aortic Stenosis

MULTICENTER, OPEN-LABEL, RANDOMIZED TRIAL

145 Asymptomatic Patients
with very severe aortic stenosis



Early Surgery



(N=73)

Conservative Care



Watchful waiting

(N=72)

**Operative mortality
or death from
cardiovascular causes**

At 4 yr
1%

At 8 yr
1%

At 4 yr
6%

At 8 yr
26%

HR, 0.09; 95% CI, 0.01–0.67; P=0.003

Early surgical intervention was associated with lower incidence
of operative mortality or cardiovascular death

D.-H. Kang et al. 10.1056/NEJMoa1912846

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CENTRAL ILLUSTRATION Mortality Associated With Untreated Aortic Stenosis

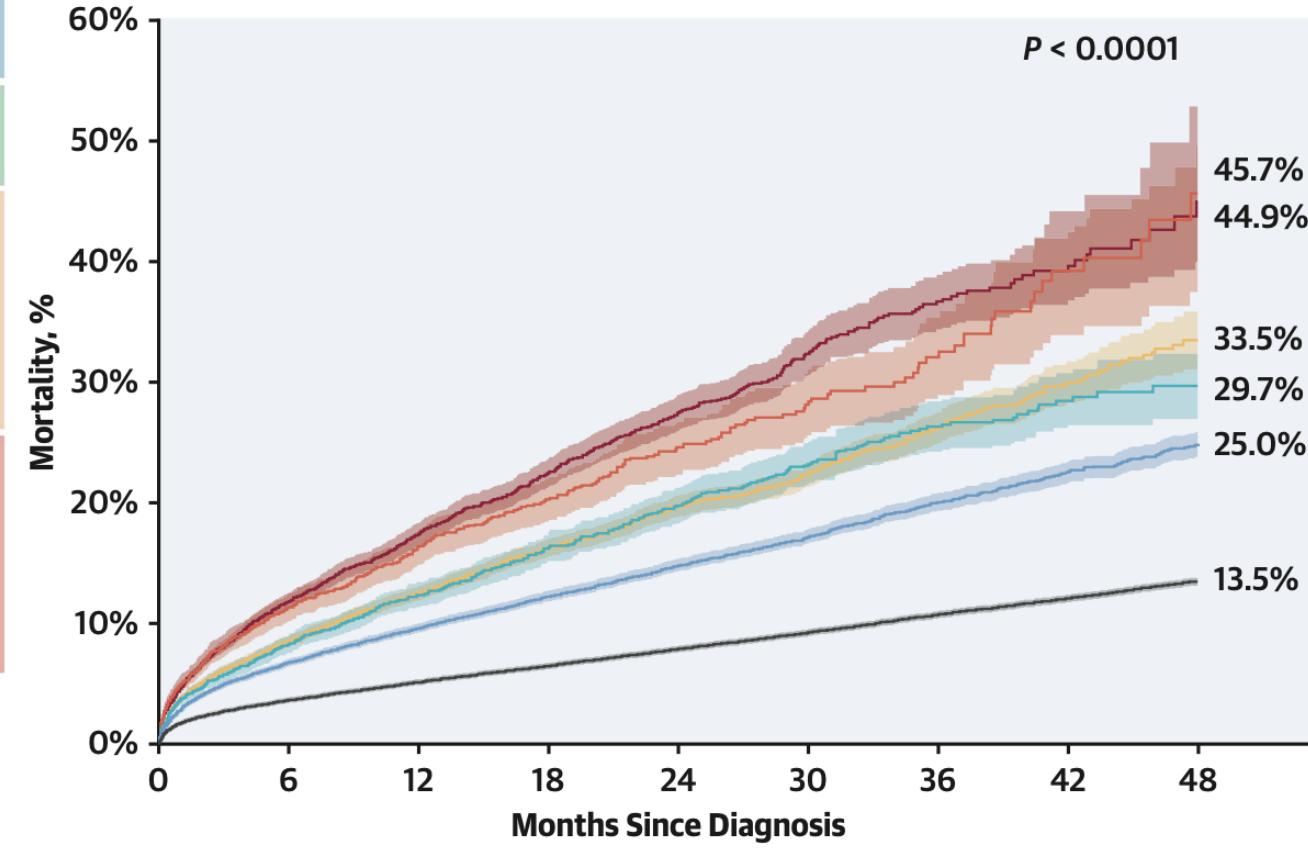
595,120 Patients With AS Assessment

No AS
524,342 (88.1%)

AS Dx
70,778 (11.9%)

AS Severity	ACC/AHA Dx		4-Year Treatment Rates With AVR	4-Year Mortality Without AVR
	Intermediate Dx	Intermediate Dx		
Mild AS	61,293 (86.6%)	9,485 (13.4%)	1.0%	25.0%
Mild-to-Moderate AS	5,796 (8.2%)		4.2%	29.7%
Moderate AS	14,550 (20.6%)		11.4%	33.5%
Moderate-to-Severe AS	3,689 (5.2%)		36.7%	45.7%
Severe AS	12,129 (17.1%)		60.7%	44.9%

Généreux P, et al. J Am Coll Cardiol. 2023;82(22):2101-2109.

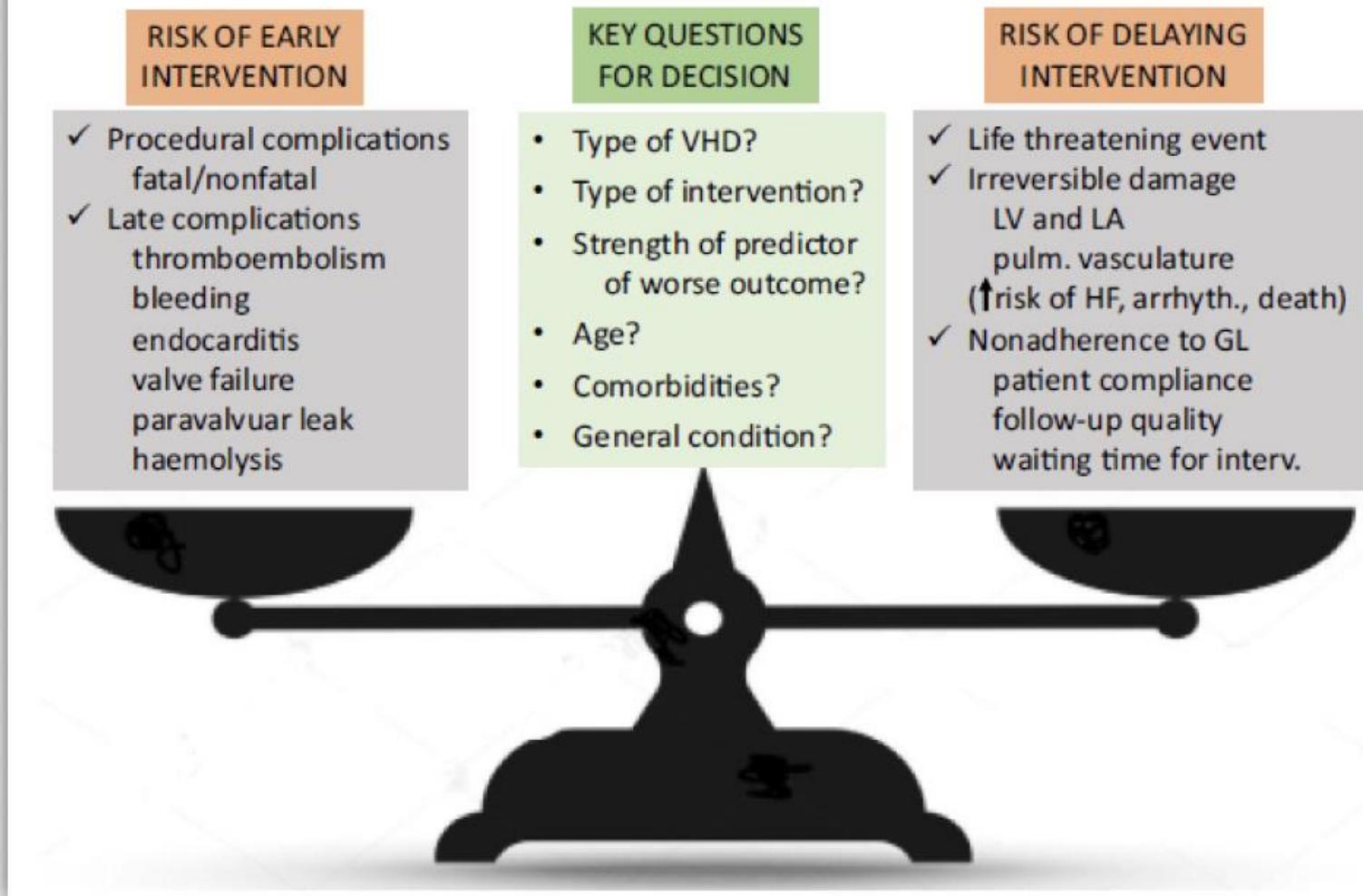


Number at risk

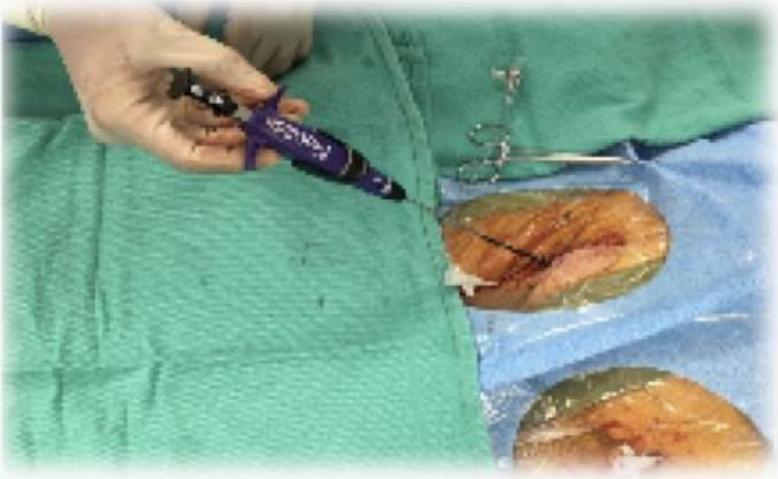
Severe	12,129	4,777	3,093	1,901	1,172	609	296	133	45
Moderate-to-Severe	3,689	1,919	1,244	789	479	258	146	65	23
Moderate	14,550	9,350	6,743	4,446	2,981	1,785	985	472	160
Mild-to-Moderate	5,796	3,778	2,722	1,822	1,194	714	440	220	86
Mild	34,614	24,136	18,262	12,962	8,991	5,710	3,453	1,888	809
None	524,342	375,511	293,809	221,486	161,814	109,170	71,655	42,529	20,313



WEIGHING RISKS AND BENIFITS OF INTERVENTION IN ASYMPTOMATIC SEVERE VHD



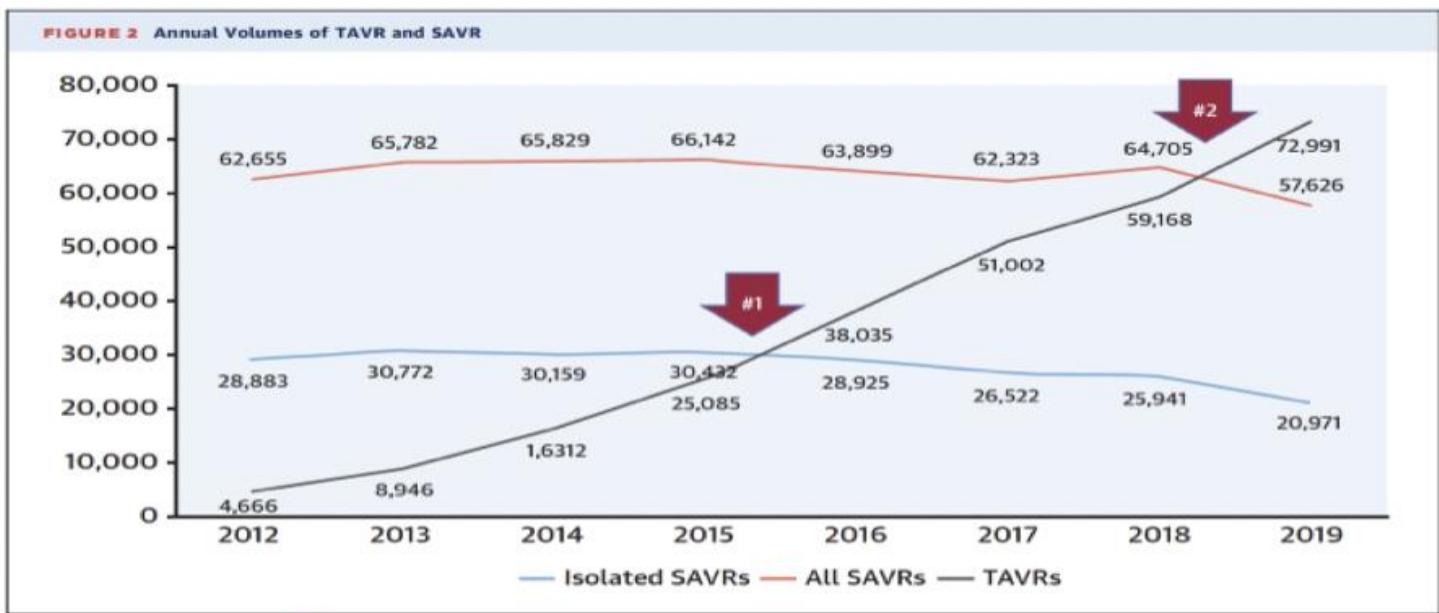
Baumgartner et al Eur Heart J 2020; doi:10.1093/eurheartj/ehaa485



TAVI & SAVR are both excellent treatment options for AS

94% increase in the number of patients receiving any form of aortic valve replacement over 7 years

Carroll J et al. STS/TVT registry. *J Am Coll Cardiol* 2021.



Clinical, Anatomical and Procedural Factors that Influence the Choice of Treatment Modality for an Individual Patient (1)

	Favours TAVI	Favours SAVR
Clinical characteristics		
Lower surgical risk	-	+
Higher surgical risk	+	-
Younger age	-	+
Older age	+	-
Previous cardiac surgery (particularly intact coronary artery bypass grafts at risk of injury during repeat sternotomy)	+	-
Severe frailty	+	-
Active or suspected endocarditis	-	+

Clinical, Anatomical and Procedural Factors that Influence the Choice of Treatment Modality for an Individual Patient (2)

	Favours TAVI	Favours SAVR
Anatomical and procedural factors		
TAVI feasible via transfemoral approach	+	-
Transfemoral access challenging or impossible and SAVR feasible	-	+
Transfemoral access challenging or impossible and SAVR inadvisable	+	-
Sequelae of chest radiation	+	-
Porcelain aorta	+	-
High likelihood of severe patient–prosthesis mismatch (AVA <0.65 cm ² /m ² BSA)	+	-

Clinical, Anatomical and Procedural Factors that Influence the Choice of Treatment Modality for an Individual Patient (3)

	Favours TAVI	Favours SAVR
Anatomical and procedural factors (continued)		
Severe chest deformation or scoliosis	+	-
Aortic annular dimensions unsuitable for available TAVI devices	-	+
Bicuspid aortic valve	-	+
Valve morphology unfavourable for TAVI (e.g. high risk of coronary obstruction due to low coronary ostia or heavy leaflet/LVOT calcification)	-	+
Thrombus in aorta or LV	-	+

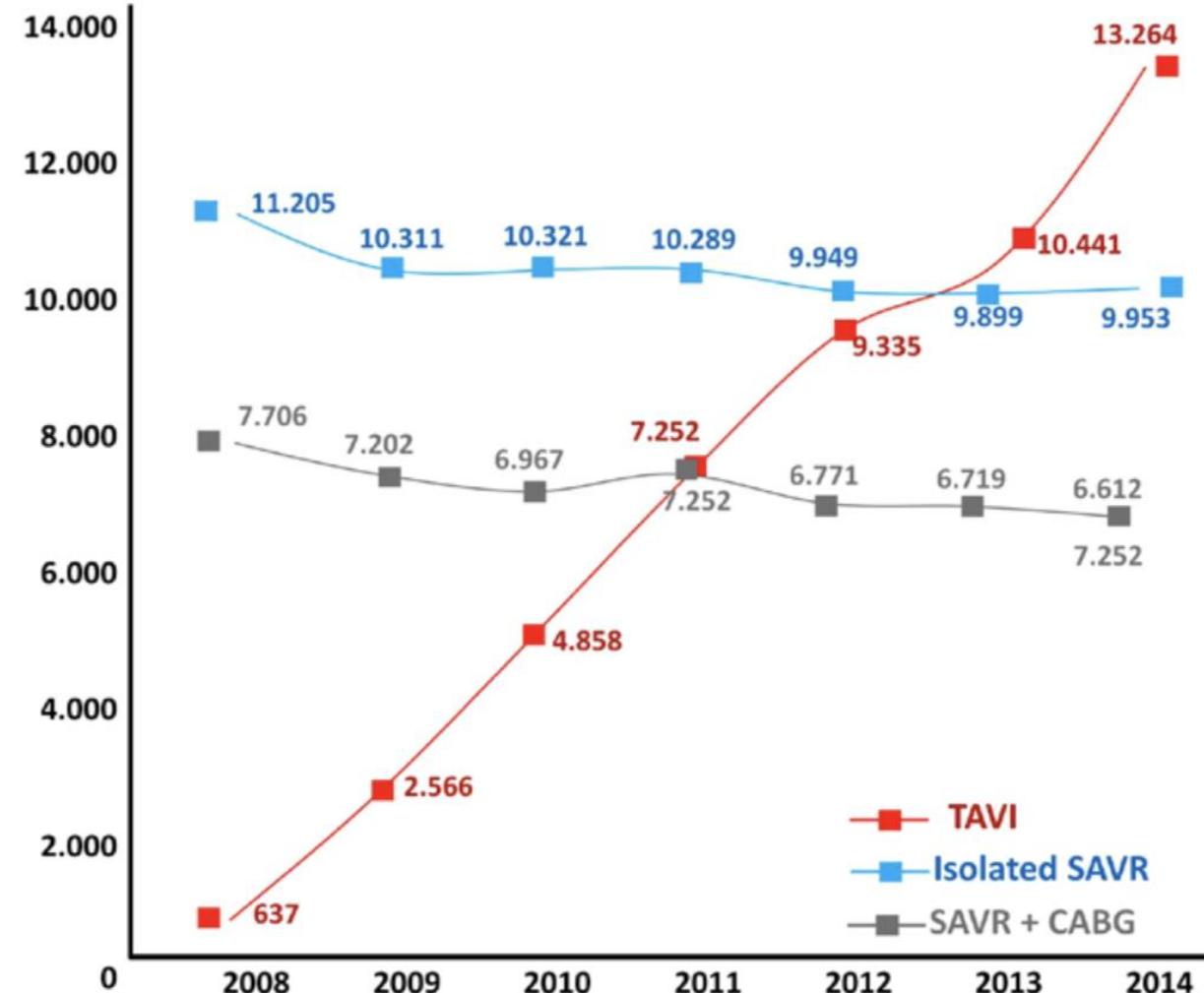
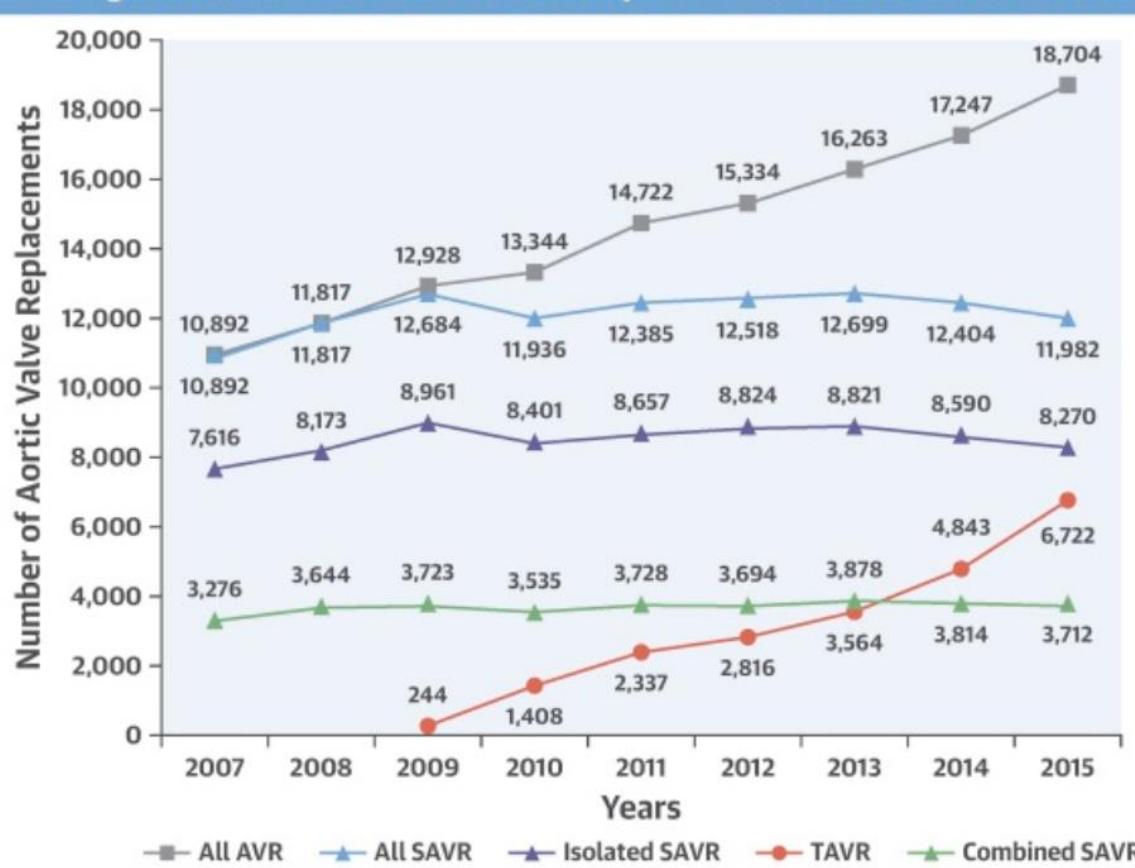
Clinical, Anatomical and Procedural Factors that Influence the Choice of Treatment Modality for an Individual Patient (4)

	Favours TAVI	Favours SAVR
Concomitant cardiac conditions requiring intervention		
Significant multi-vessel CAD requiring surgical revascularization	-	+
Severe primary mitral valve disease	-	+
Severe tricuspid valve disease	-	+
Significant dilatation/aneurysm of the aortic root and/or ascending aorta	-	+
Septal hypertrophy requiring myectomy	-	+

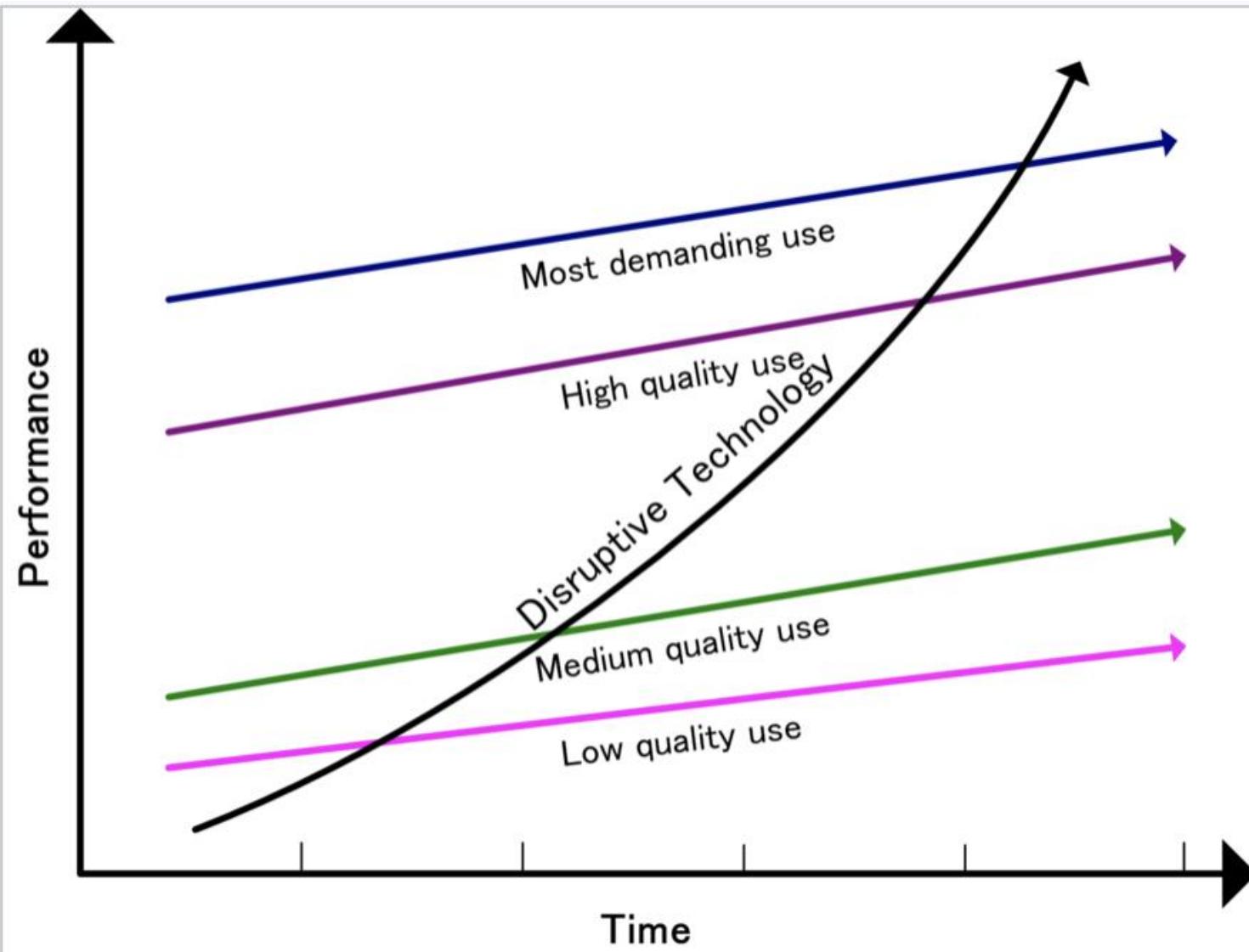
Summary and Take Home Messages

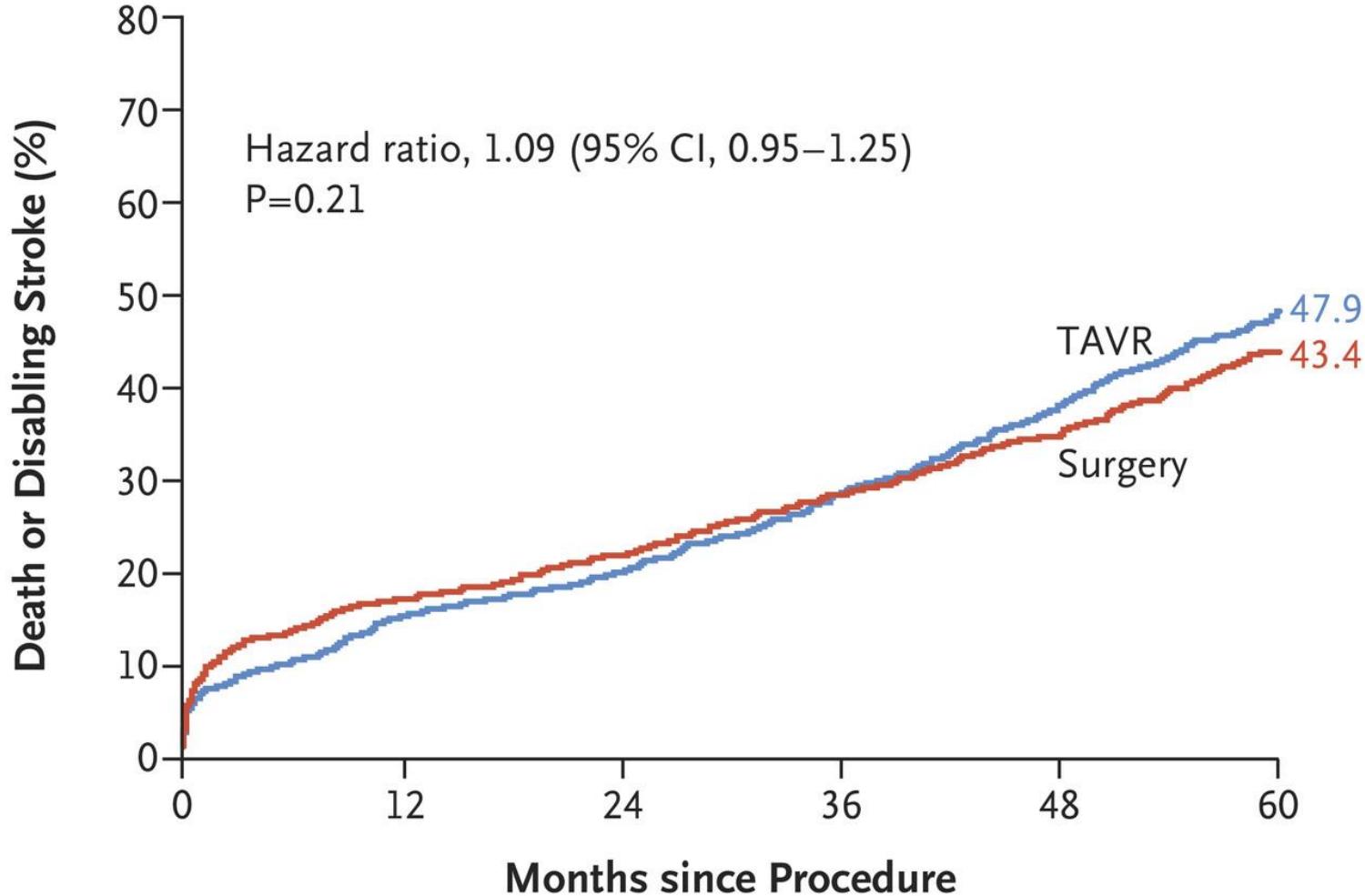
- SAVR and TAVI are both excellent treatment options for AS
- The choice between TAVI and SAVR must be based upon Heart Team evaluation for all patients
- Basic scenarios
 - SAVR: younger patients (<75 yrs) at low surgical risk
 - SAVR: unsuitable for TF TAVI and operable
 - TAVI: older patients (≥ 75 yrs)
 - TAVI: inoperable or high surgical risk
- The mode of intervention in all other scenarios should be determined by careful consideration of the clinical, anatomical and procedural characteristics of each individual patient
- The Heart Team recommendation should be discussed with the patient who can then make an informed treatment choice

A Changes in Number of Aortic Valve Replacements From 2007 to 2015



Disruptive Innovation



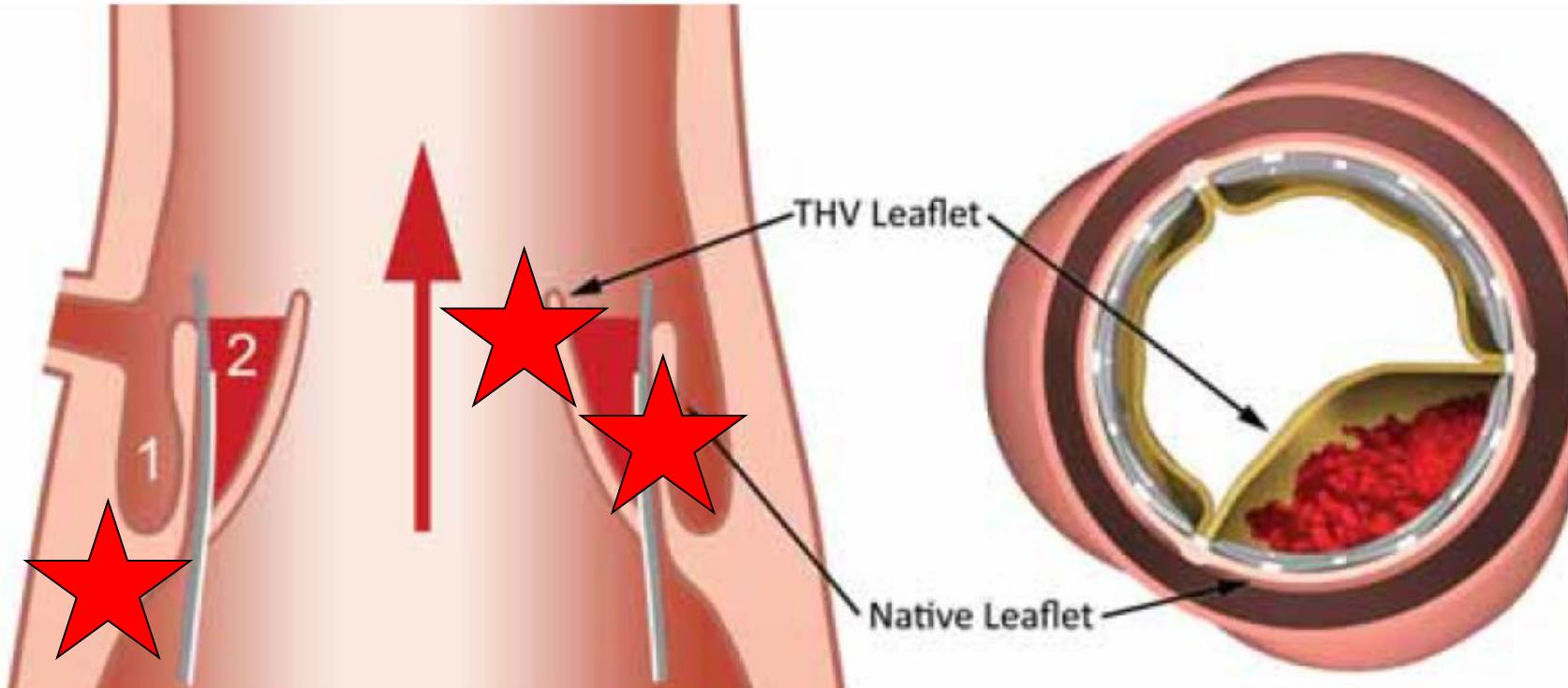


No. at Risk

TAVR	1011	843	785	687	581	474
Surgery	1021	771	704	625	547	440

Aortic Stenosis in the Elderly SAVR or TAVI ?

Conceptual Limitations of TAVI – the Triple Problem

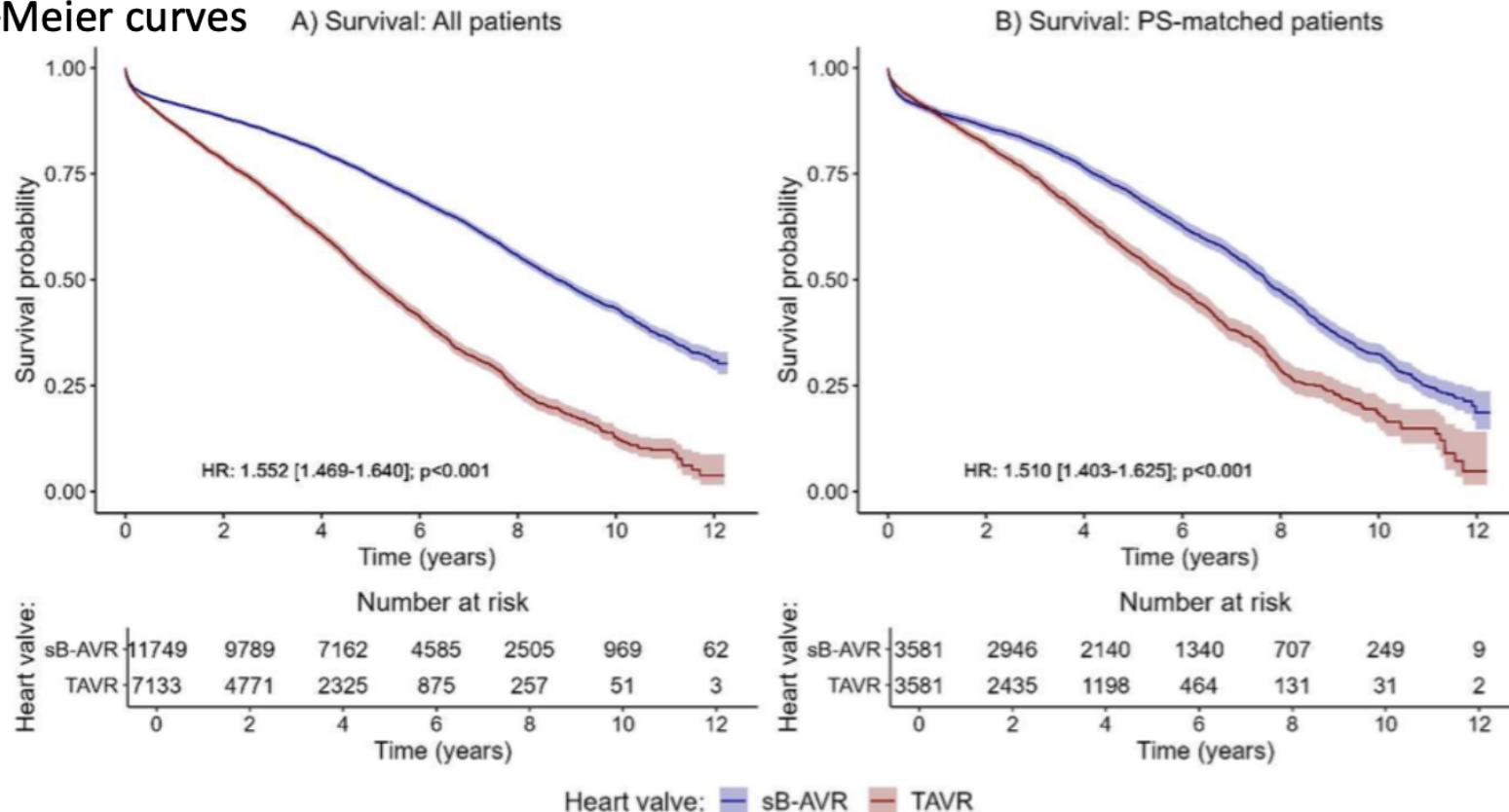


Results

Median follow-up was 4.0 (interquartile range 2.1–6.5) years (maximum 12.3 years)

Overall survival was significantly worse in TAVR patients both in the overall cohort and PSM cohort

Kaplan–Meier curves



Standard Cox regression accounting for several confounding factors*, showed an increased all-cause mortality with TAVR (**1.552, 95% CI 1.469–1.640, p<0.001**)

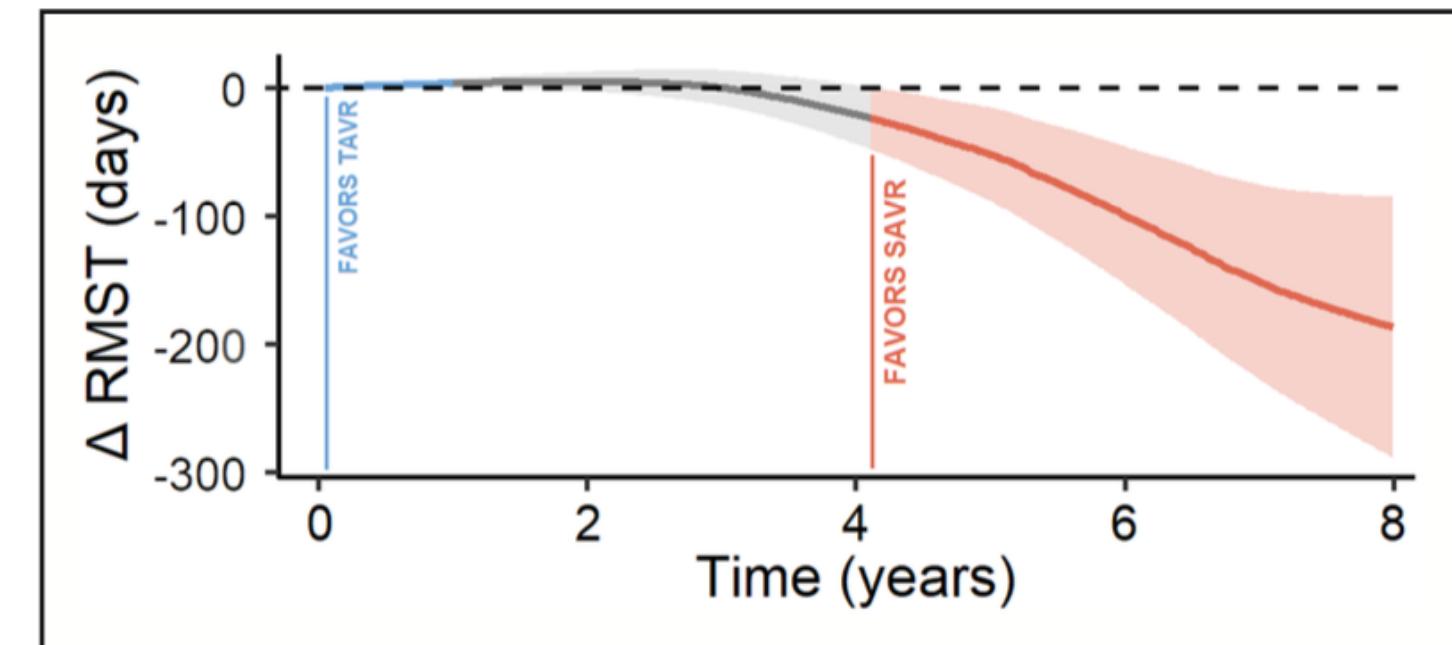
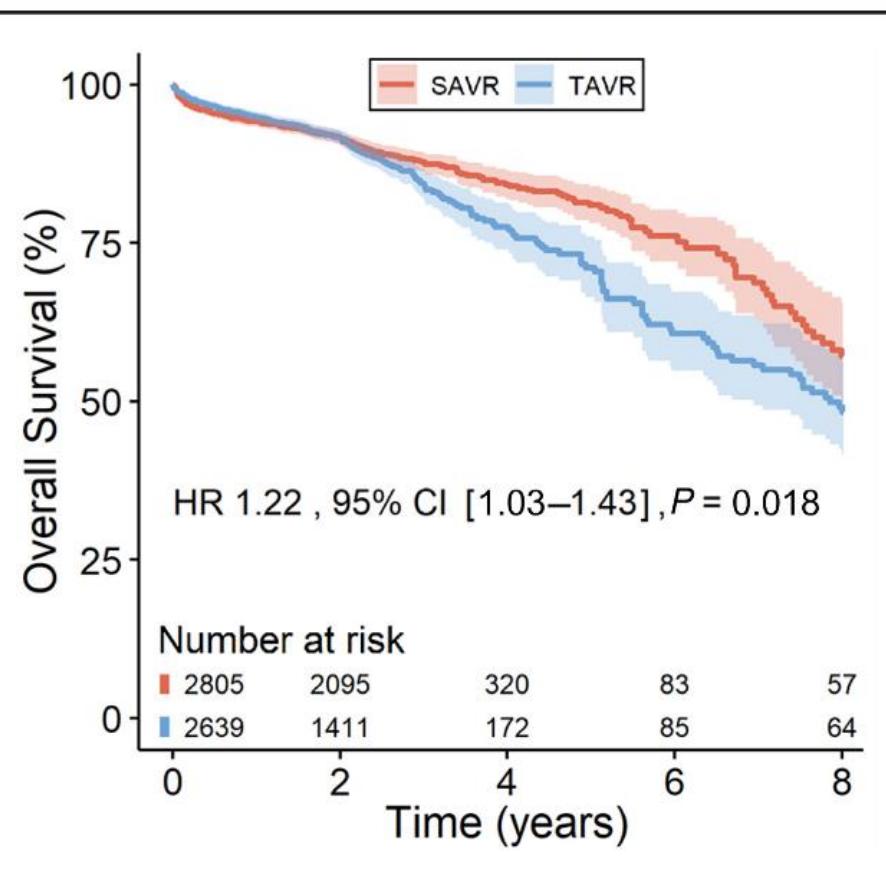
*Age, sex, heart failure, myocardial infarction, stroke, diabetes mellitus, adiposity, hyperlipidaemia, hyperuricaemia/gout, valvular/rhythmogenic/other cardiomyopathies (CMPs), ischaemic CMP, atherosclerotic CV disease, pulmonary diseases, chronic kidney diseases, or malignant diseases prior to the index operation



Manufacturer	932	
Edwards Lifesciences	776 (83)	
Sorin	73 (7.8)	
St. Jude	62 (6.7)	
Medtronic	21 (2.2)	

Midterm Survival of Low-Risk Patients Treated With Transcatheter Versus Surgical Aortic Valve Replacement: Meta-Analysis of Reconstructed Time-to-Event Data

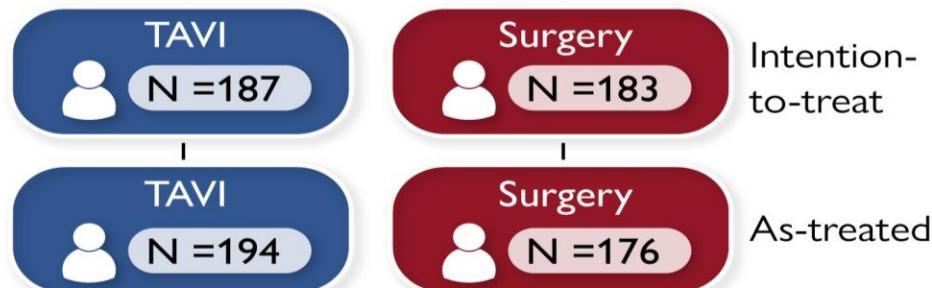
Michel Pompeu Sá , MD, MSc, MHBA, PhD*; Xander Jacquemyn , BSc*; Jef Van den Eynde , BSc;



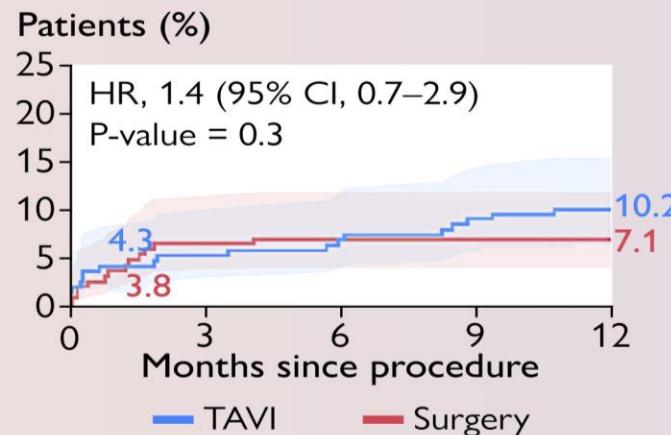
Aims and methods

NOTION-2

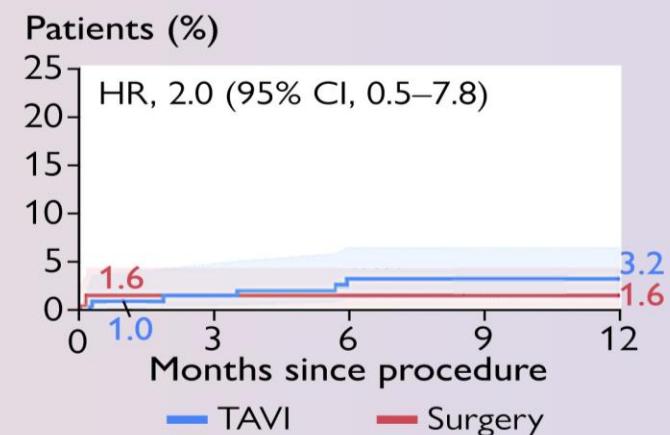
370 patients with severe symptomatic aortic stenosis ≤ 75 years



Death, stroke or rehospitalization



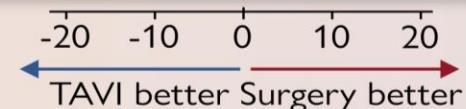
Death or disabling stroke



Tricuspid AS

TAVI vs surgery-risk difference Percentage points (95% CI)

Death, stroke, or rehospitalization	0.4 (-6.3 to 7.0)
Death or disabling stroke	0.7 (-2.5 to 3.9)
Death from any cause	0.7 (-1.8 to 3.2)
Stroke	2.8 (-1.7 to 7.3)
Disabling stroke	0 (-3.0 to 2.8)
Rehospitalization	-2.5 (-7.6 to 2.7)
Paravalvular regurgitation \geq moderate	3.1 (0.1 to 6.1)



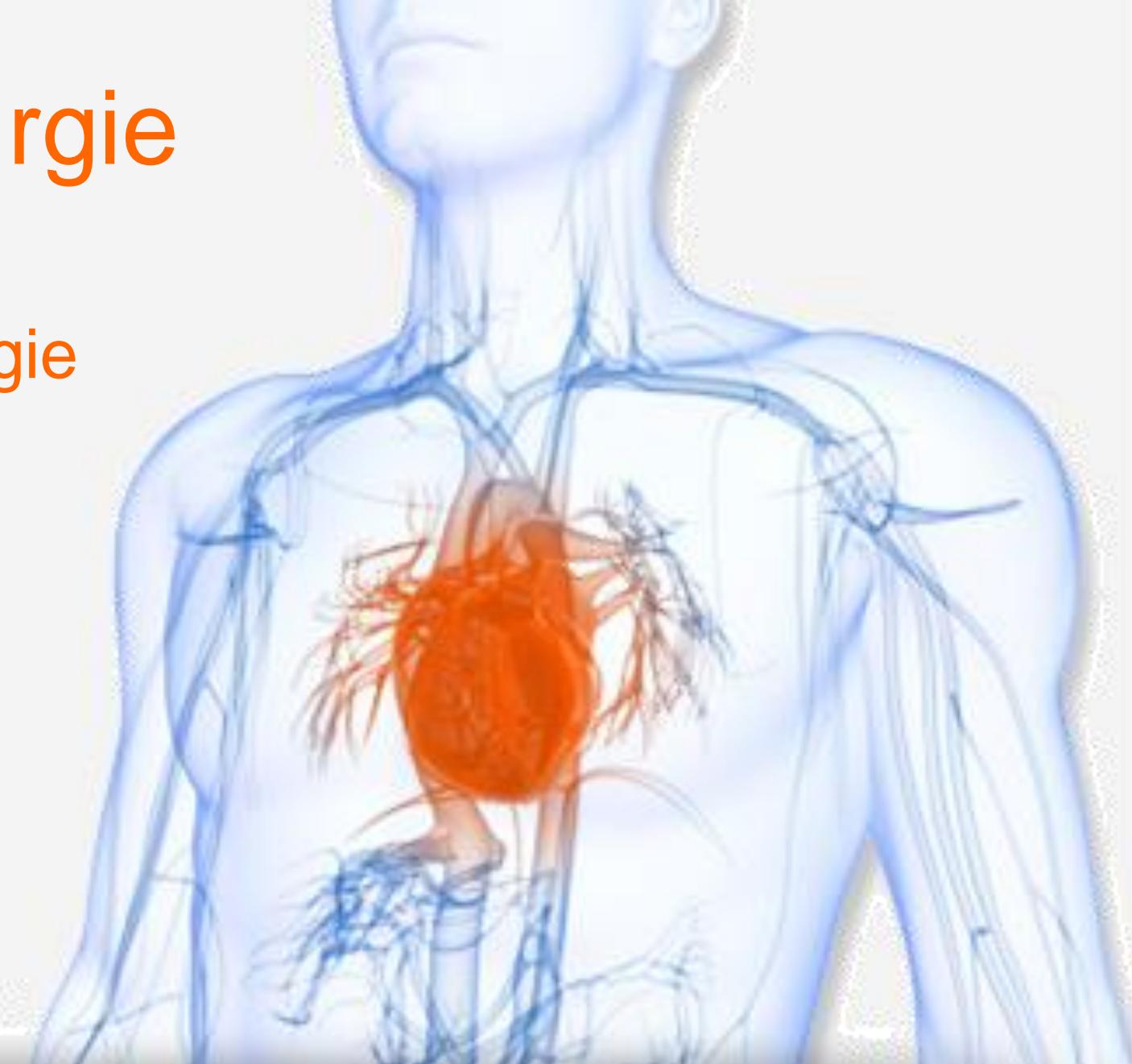
Bicuspid AS

Death, stroke, or rehospitalization	10.4 (-0.8 to 21.5)
Death or disabling stroke	4.1 (-3.6 to 11.9)
Death from any cause	2.1 (-4.6 to 8.8)
Stroke	6.1 (-0.6 to 12.8)
Disabling stroke	2.0 (-1.9 to 6.0)
Rehospitalization	2.2 (-4.6 to 8.8)
Paravalvular regurgitation \geq moderate	9.1 (0.6 to 17.6)



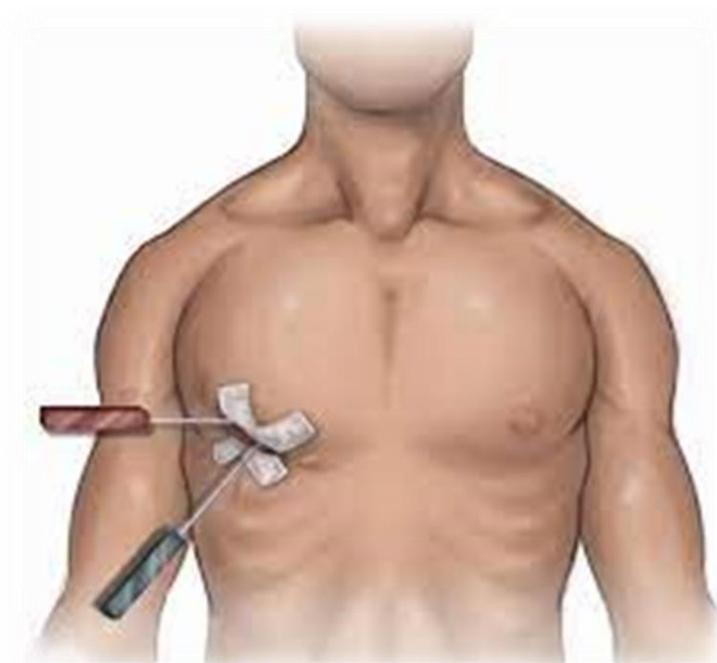
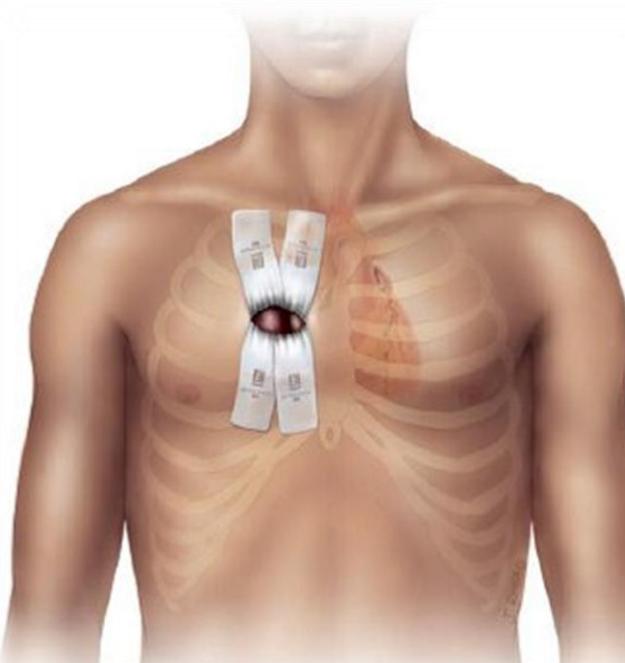
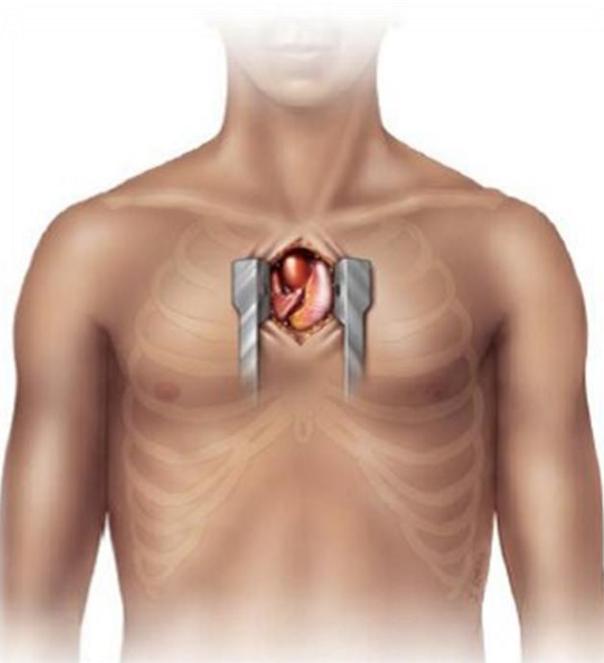
Aortenklappenchirurgie

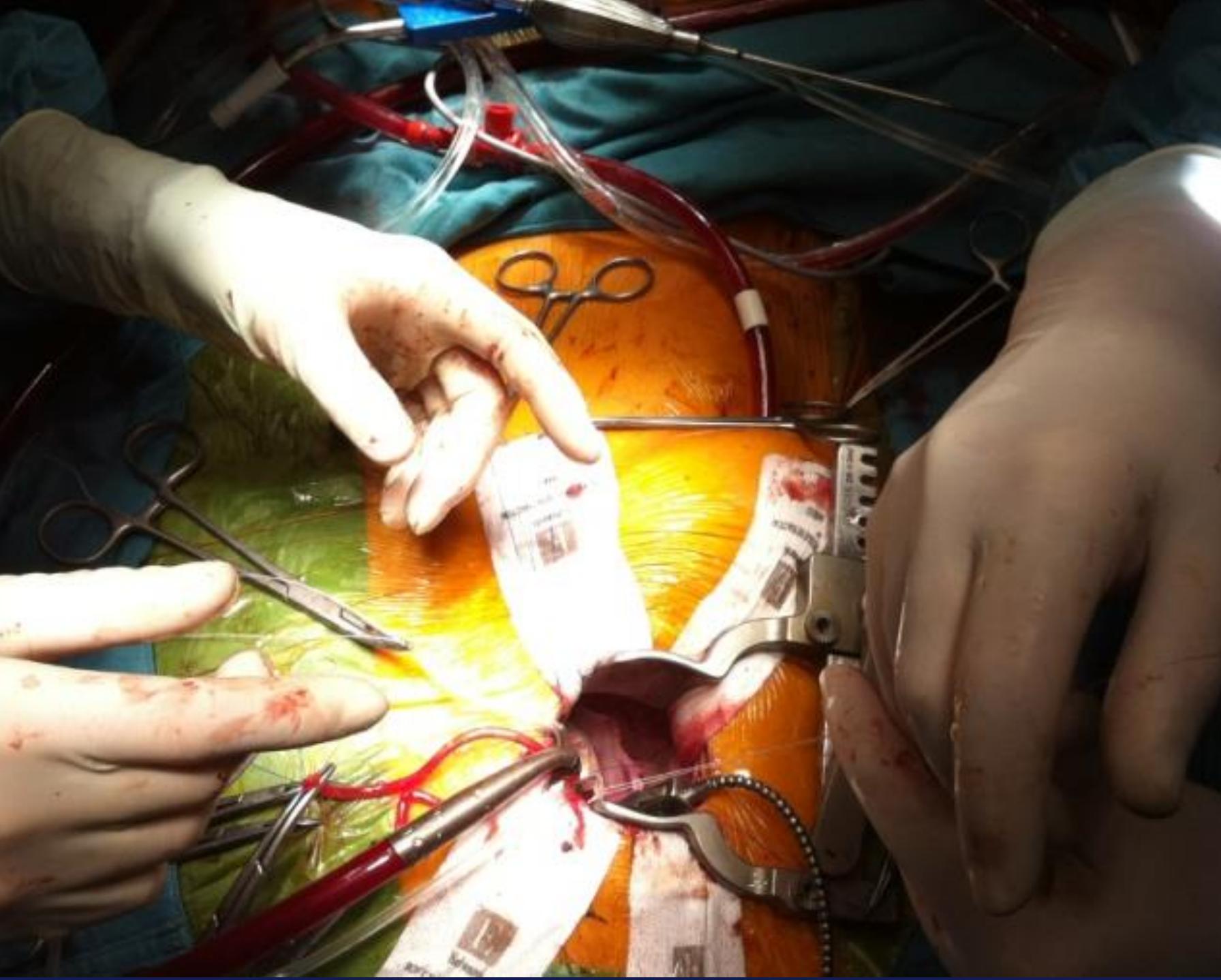
- Minimal – Invasive Chirurgie
- Moderne Herzklappen
- Ross OP
- Dezellularisierte Klappen



Minimal- und Mikroinvasive Chirurgie

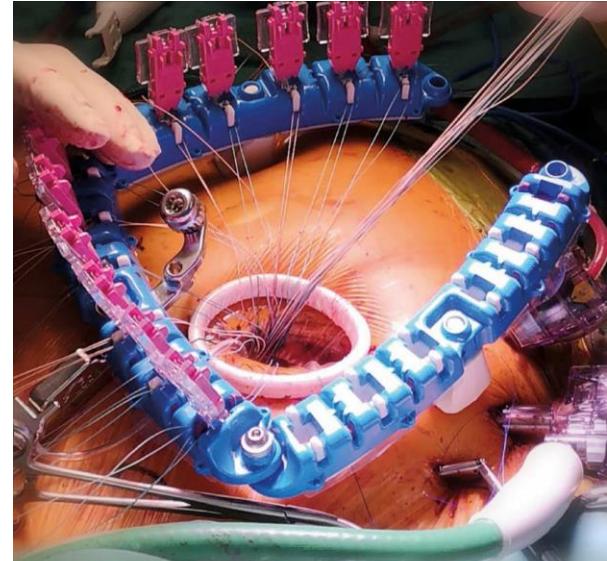
- Intakte köcherne Strukturen
- Weniger Schmerzen
- Schnellere Erholung





State of the Art – Aortenklappenersatz

- Microinvasiver Aortenklappenersatz
 - RAM system
 - Keine Durchtrennung der Rippe
 - Total – Endoskopischer Zugang



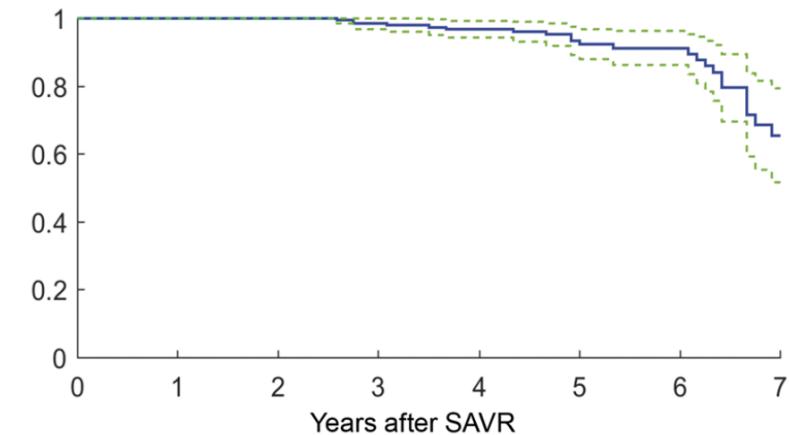
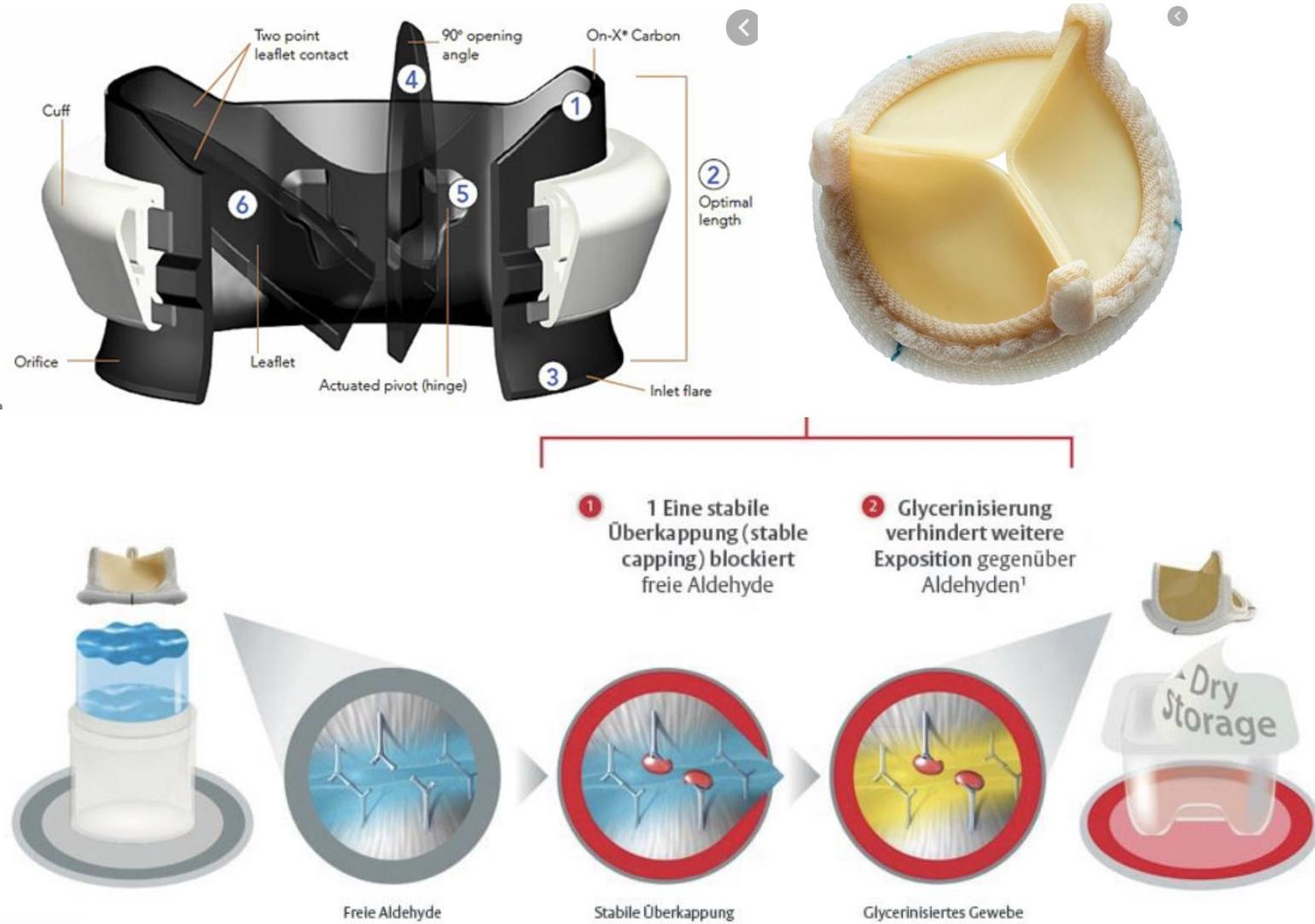
MEDICAL UNIVERSITY
OF VIENNA

Opening
**Christian Doppler
Laboratory for Micro-
invasive Heart Surgery**

Monday, 24th April 2023, 2.30 – 3.30 pm
Jugendstilhörsaal, MedUni Vienna
Spitalgasse 23, 1090 Vienna

www.meduniwien.ac.at/microHS

Konventionelle Herzklappen



Werner P, Gritsch J, Scherzer S, Gross C, Russo M, Coti I, Kocher A, Laufer G, Andreas M. Structural valve deterioration after aortic valve replacement with the Trifecta valve. *Interact Cardiovasc Thorac Surg*. 2020 Nov 22;ivaa236. doi: 10.1093/icvts/ivaa236. Epub ahead of print. PMID: 33221889.

Ongoing innovation in the surgical area

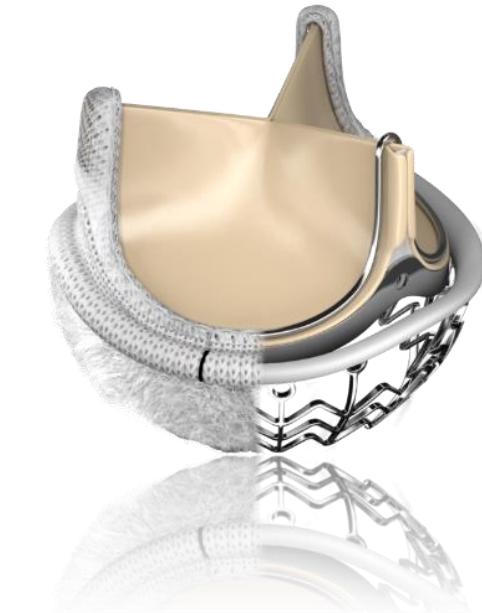
**Proven
durability**



+



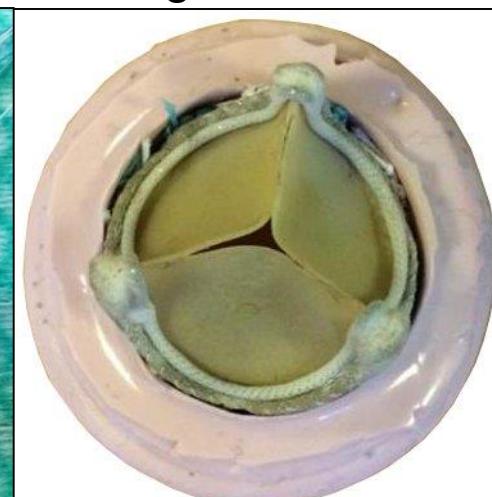
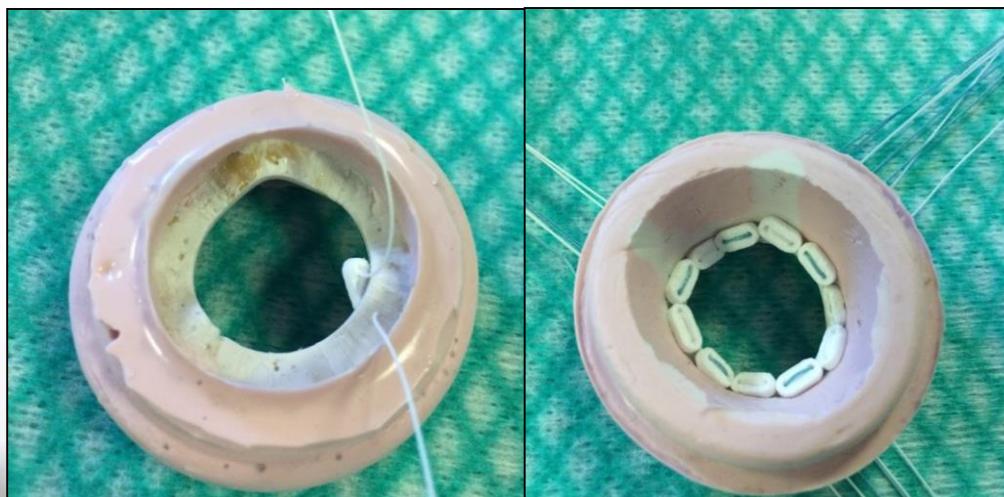
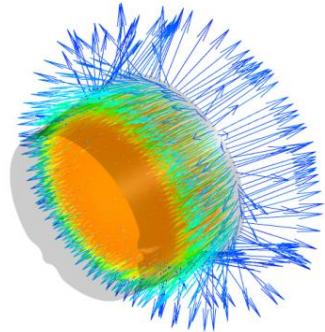
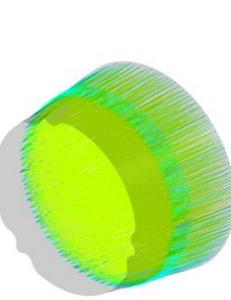
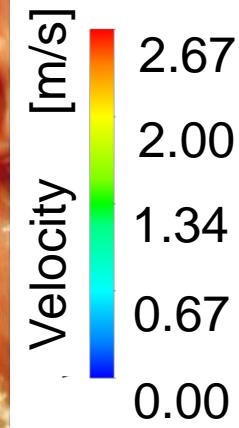
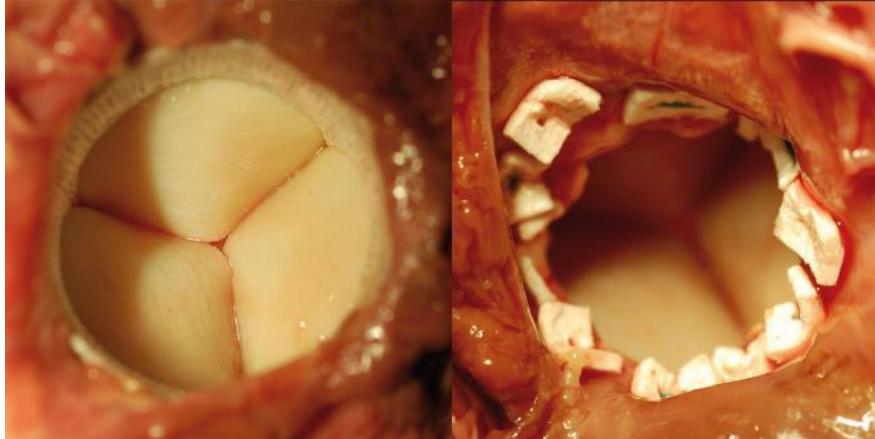
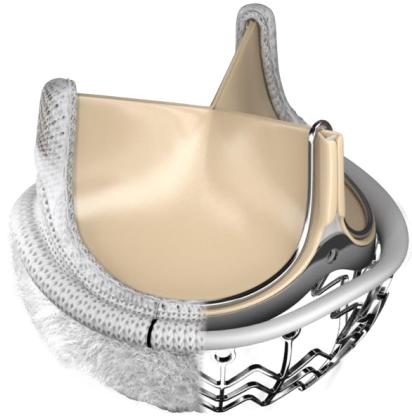
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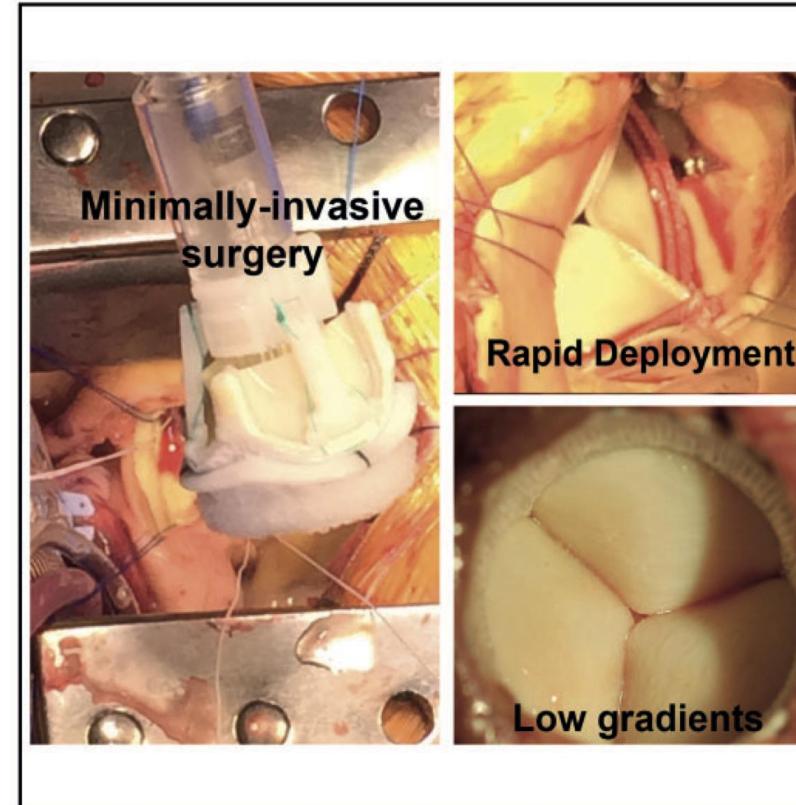
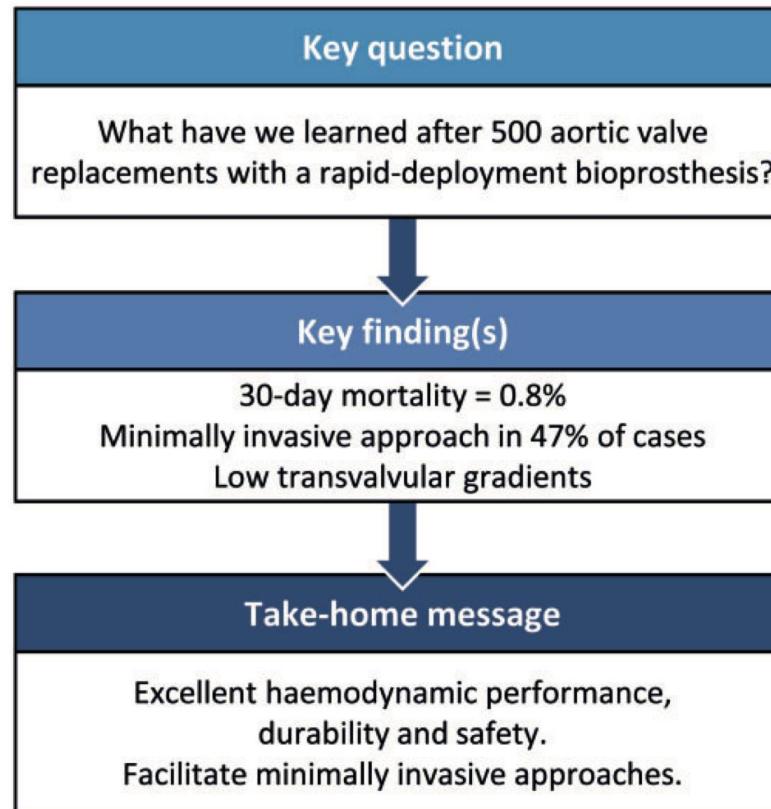
**Structure allowing
easy and fast
implantation**

**New category of
surgical valve**

Bessere Hämodynamik

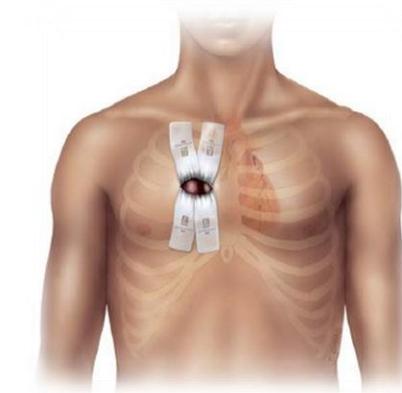


Ergebnis der ersten 500 Patienten in Wien



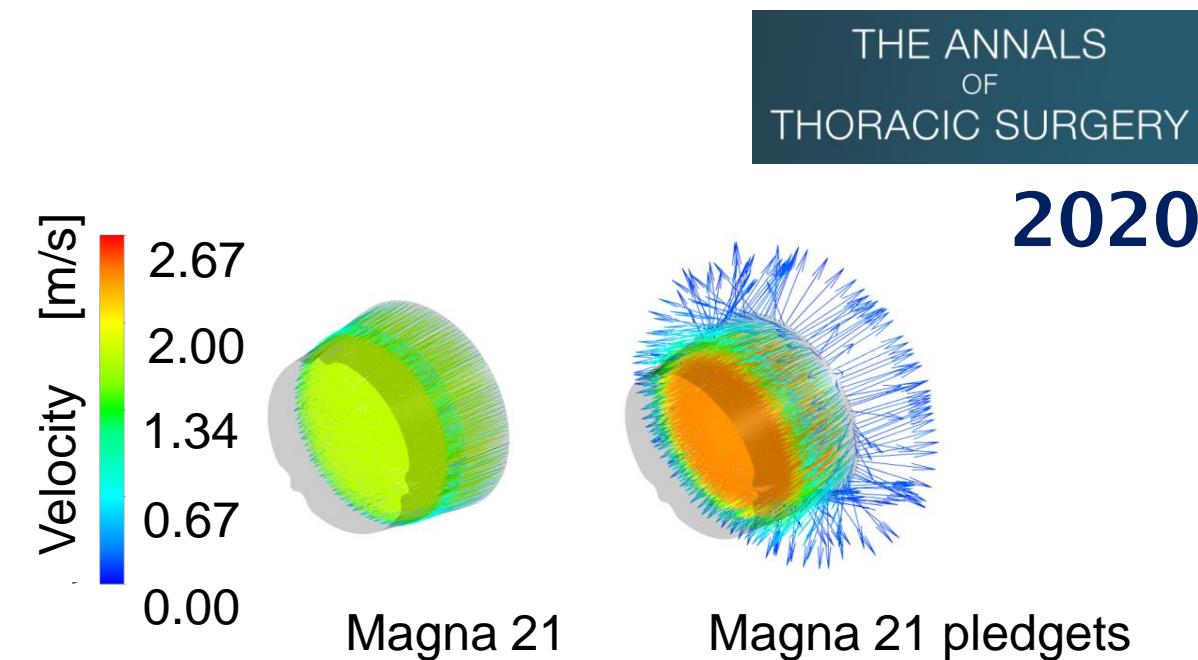
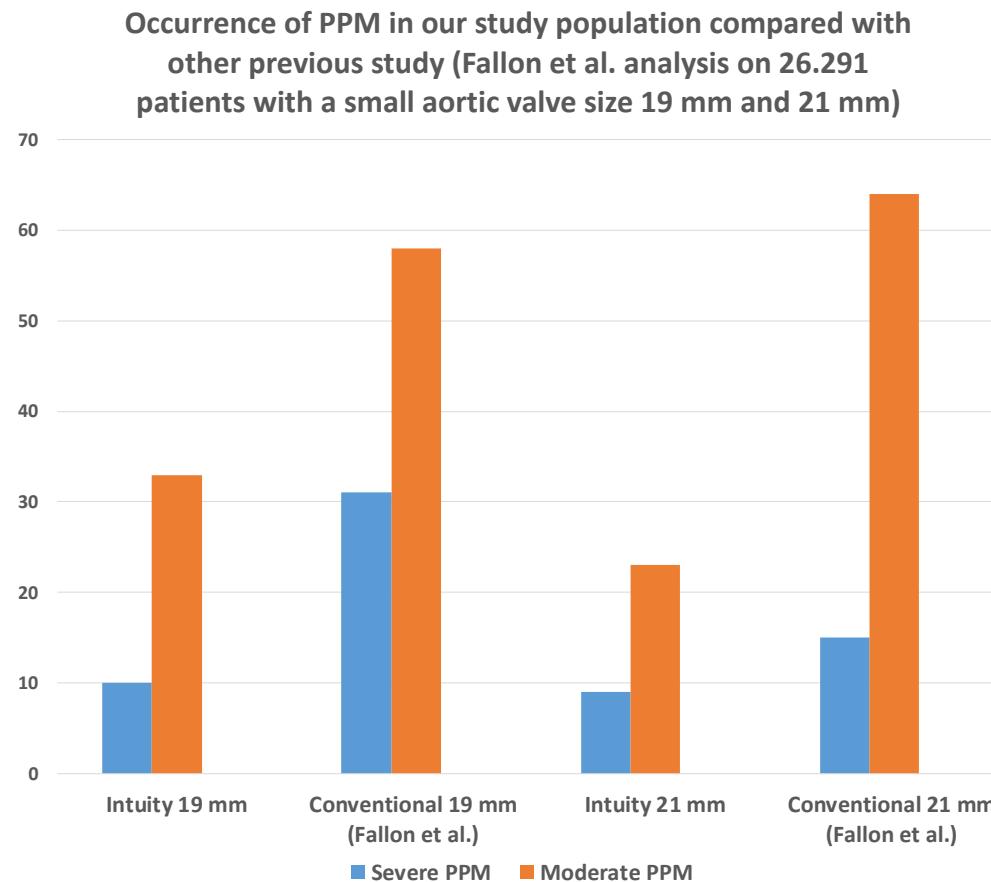
EUROPEAN JOURNAL OF
CARDIO-THORACIC SURGERY

2019



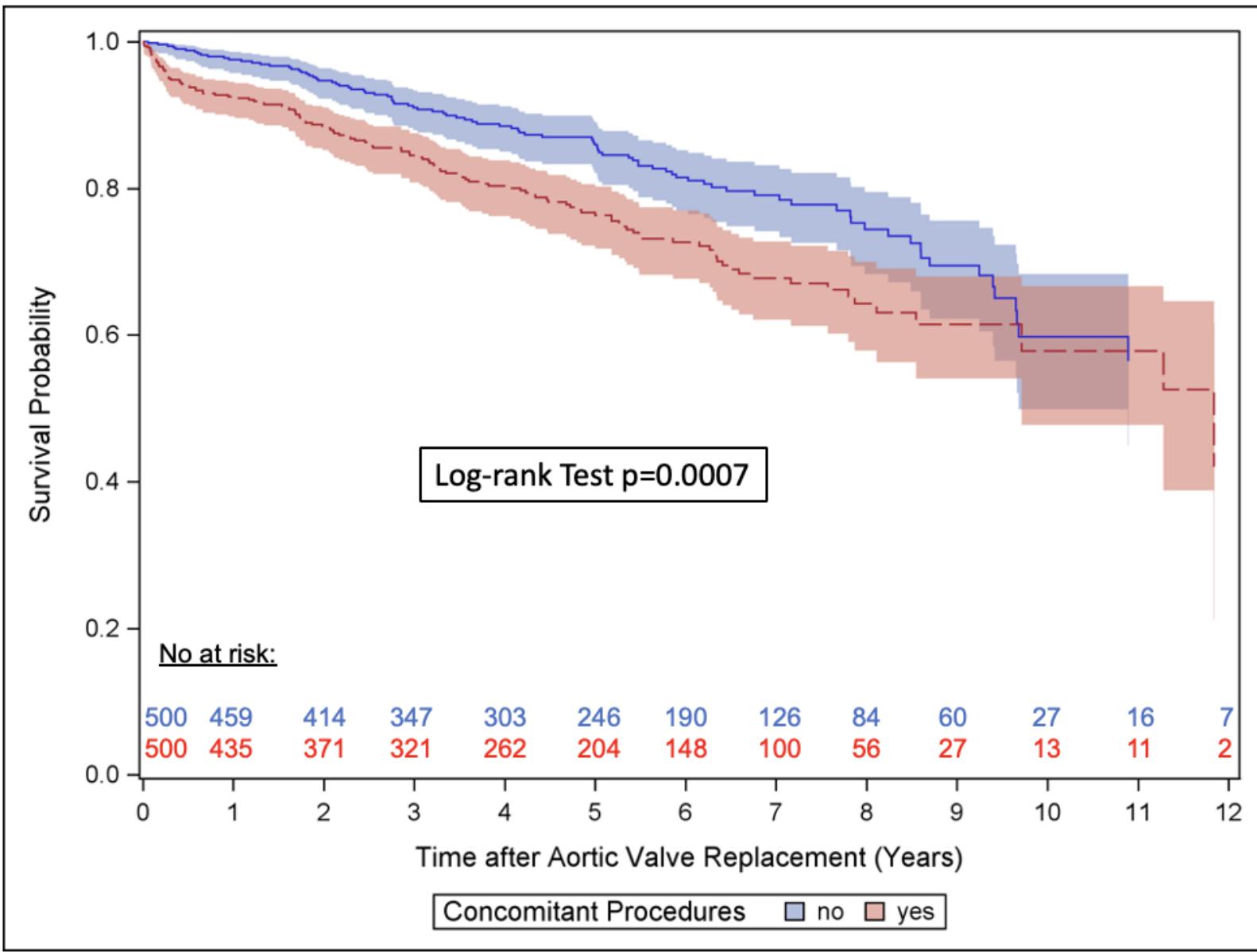
Andreas M, Coti I, Rosenhek R, Shabanian S, Mahr S, Uyanik-Uenal K, Wiedemann D, Binder T, Kocher A, Laufer G. Intermediate-term outcome of 500 consecutive rapid-deployment surgical aortic valve procedures†. Eur J Cardiothorac Surg. 2019 Mar 1;55(3):527-533. doi: 10.1093/ejcts/ezy273.

Geeignet auch für kleine Herzen

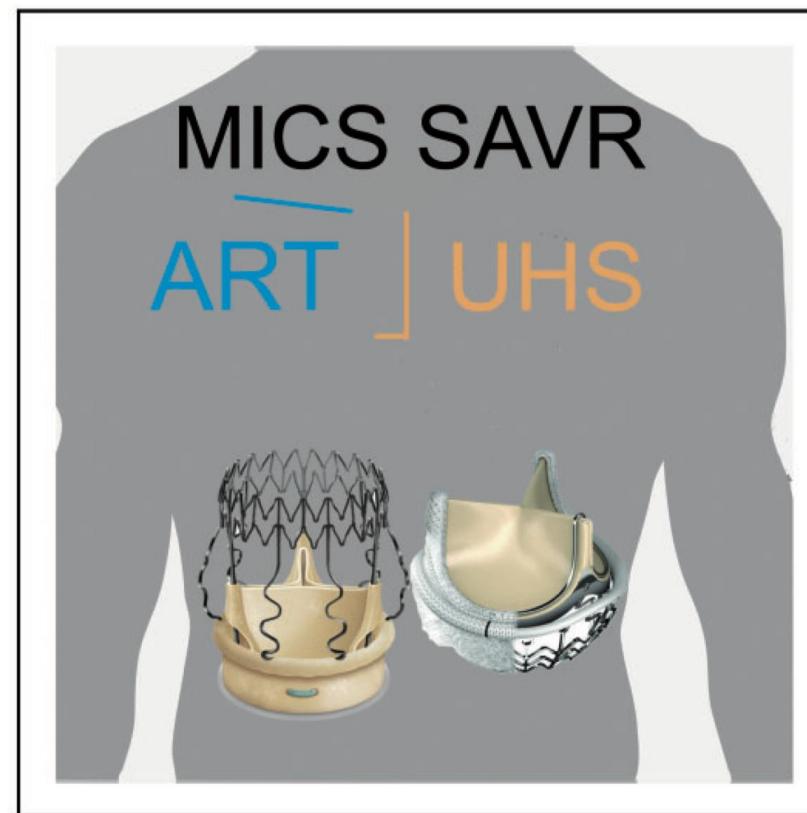
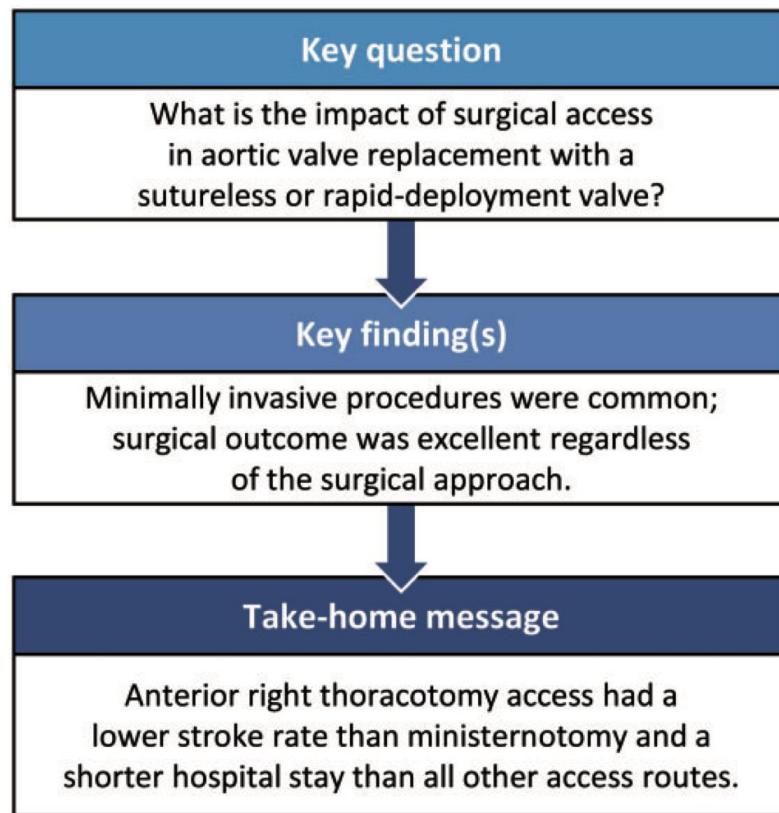


Coti I, Haberl T, Scherzer S, Shabanian S, Binder T, Kocher A, Laufer G, Andreas M. Rapid-Deployment Aortic Valves for Patients With a Small Aortic Root: A Single-Center Experience. Ann Thorac Surg. 2020 Nov;110(5):1549-1556. doi: 10.1016/j.athoracsur.2020.02.030. Epub 2020 Mar 21.

10 Jahre – 1000 Intuity - Implantationen



Minimalinvasiver Zugang für RD-AVR

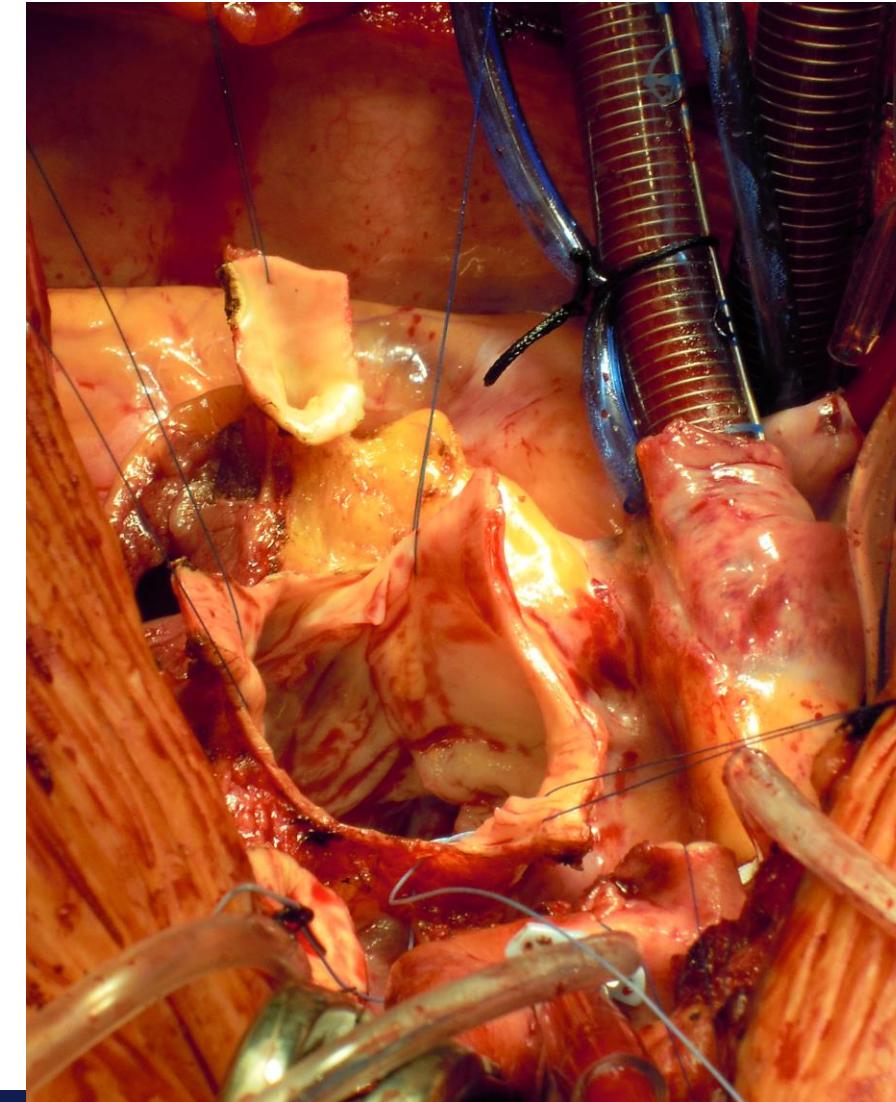
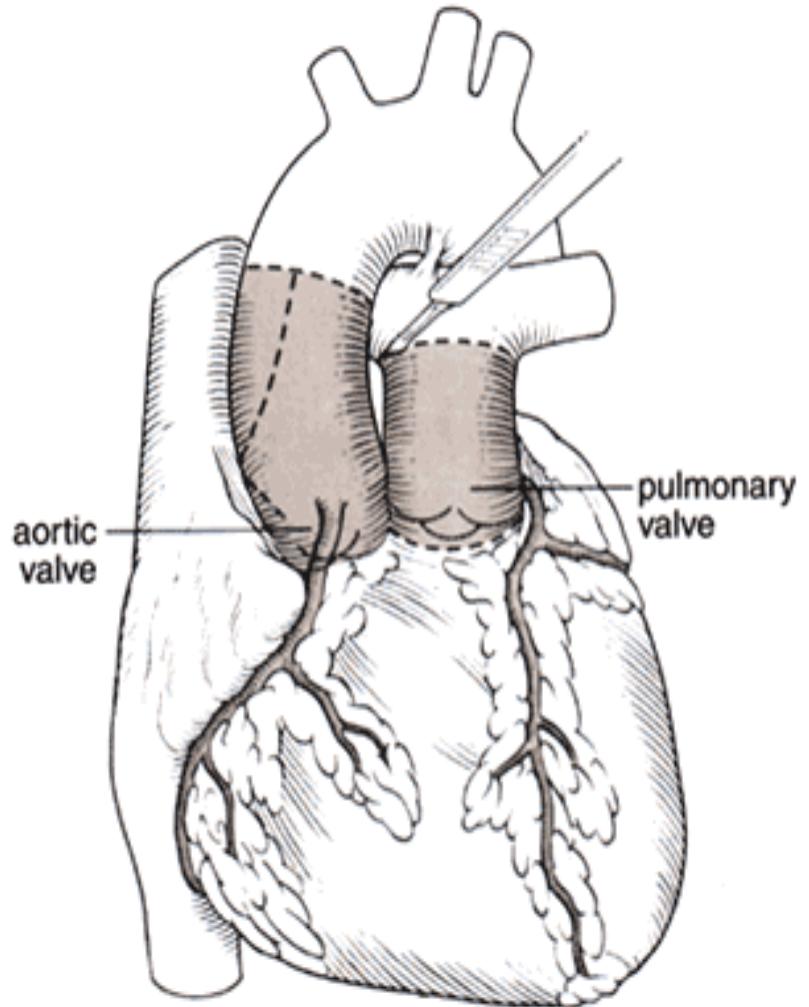


EUROPEAN JOURNAL OF
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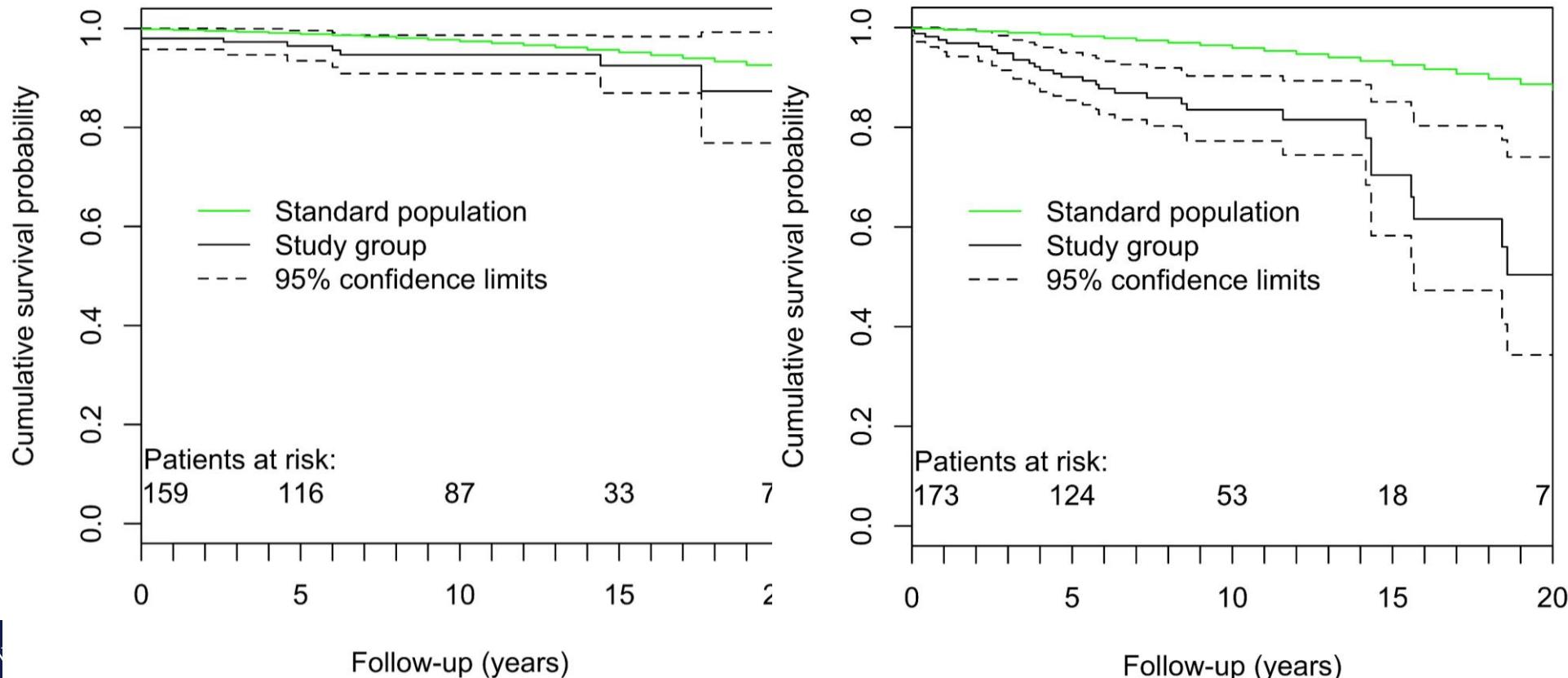
Andreas M, Berretta P, Solinas M, Santarpino G, Kappert U, Fiore A, Glauber M, Misfeld M, Savini C, Mikus E, Villa E, Phan K, Fischlein T, Meuris B, Martinelli G, Teoh K, Mignosa C, Shrestha M, Carrel TP, Yan T, Laufer G, Di Eusanio M. Minimally invasive access type related to outcomes of sutureless and rapid deployment valves. Eur J Cardiothorac Surg. 2020 Nov 1;58(5):1063-1071. doi: 10.1093/ejcts/ezaa154. PMID: 32588056; PMCID: PMC7577292.

Ross - Operation



The Ross procedure offers excellent survival compared with mechanical aortic valve replacement in a real-world setting[†]

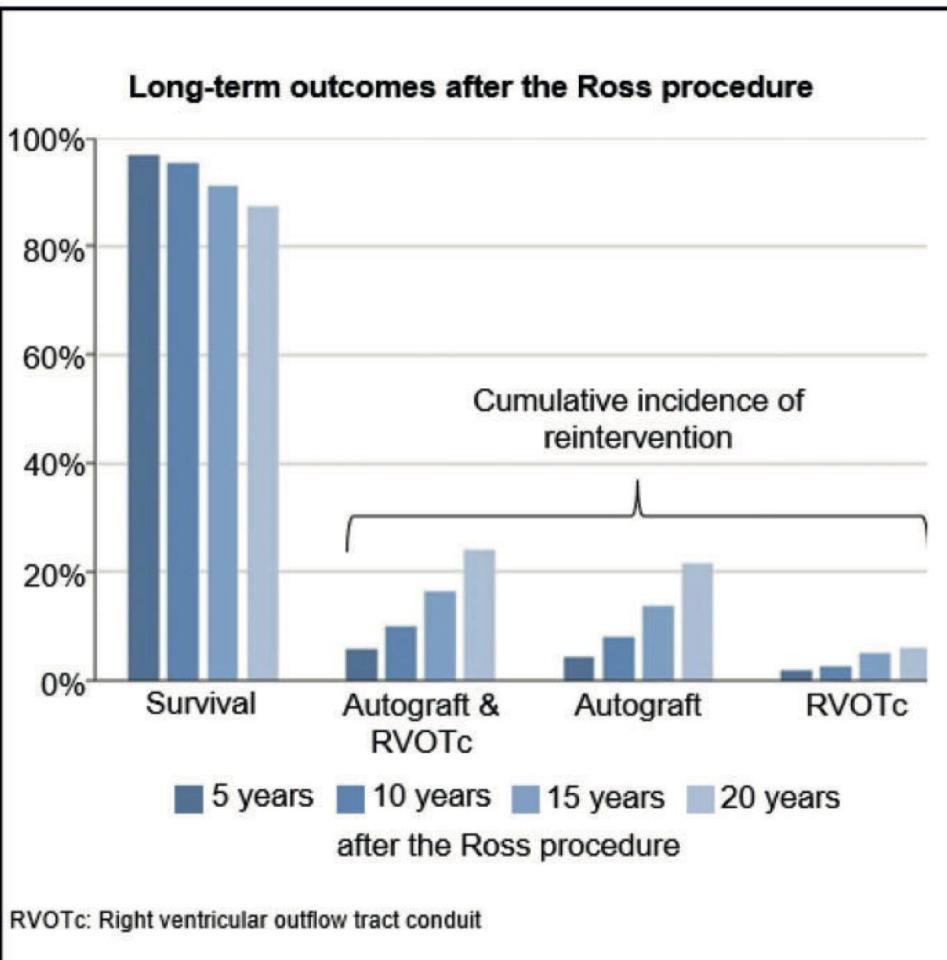
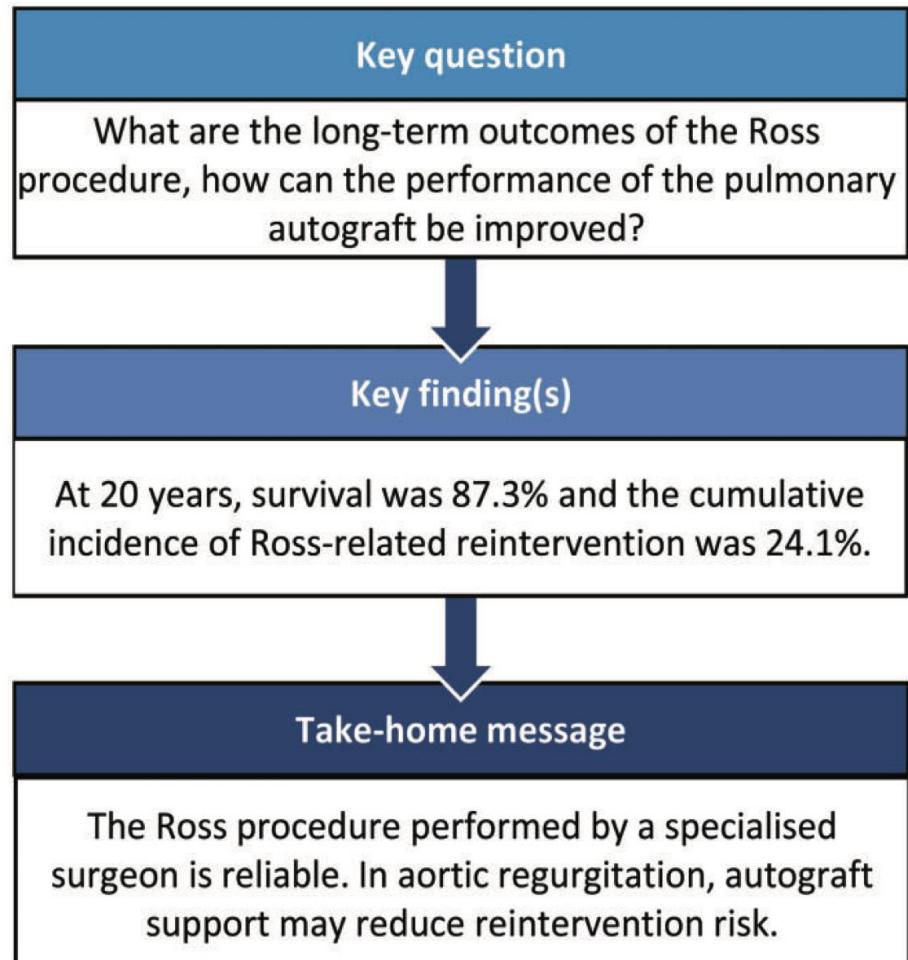
Martin Andreas^{a,*}, Dominik Wiedemann^a, Gernot Seebacher^a, Claus Rath^a, Tandis Aref^a, Raphael Rosenhek^b, Georg Heinze^c, Ernst Eigenbauer^c, Paul Simon^a, Kurt Ruetzler^d, Joerg-Michael Hiesmayr^d, Anton Moritz^e, Guenther Laufer^a and Alfred Kocher^a

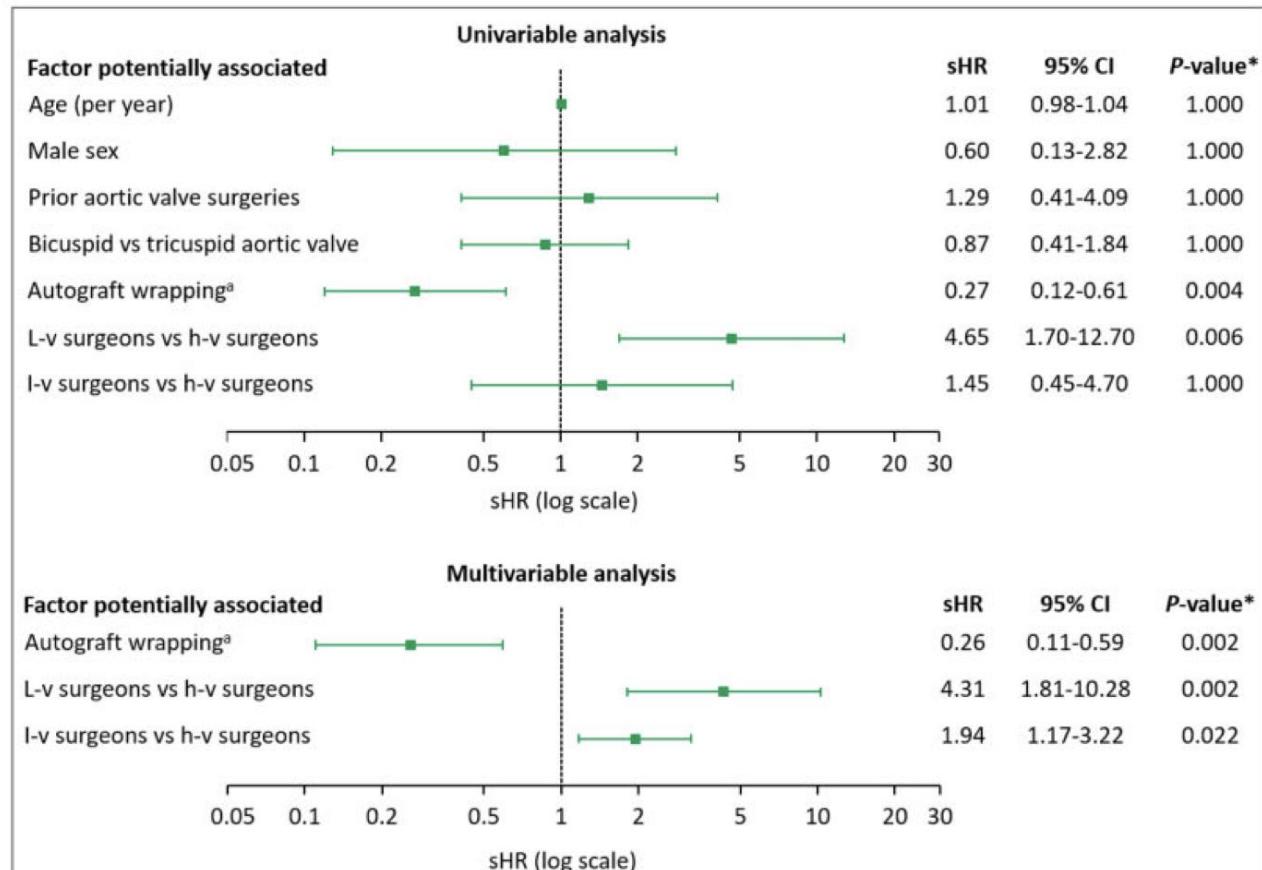
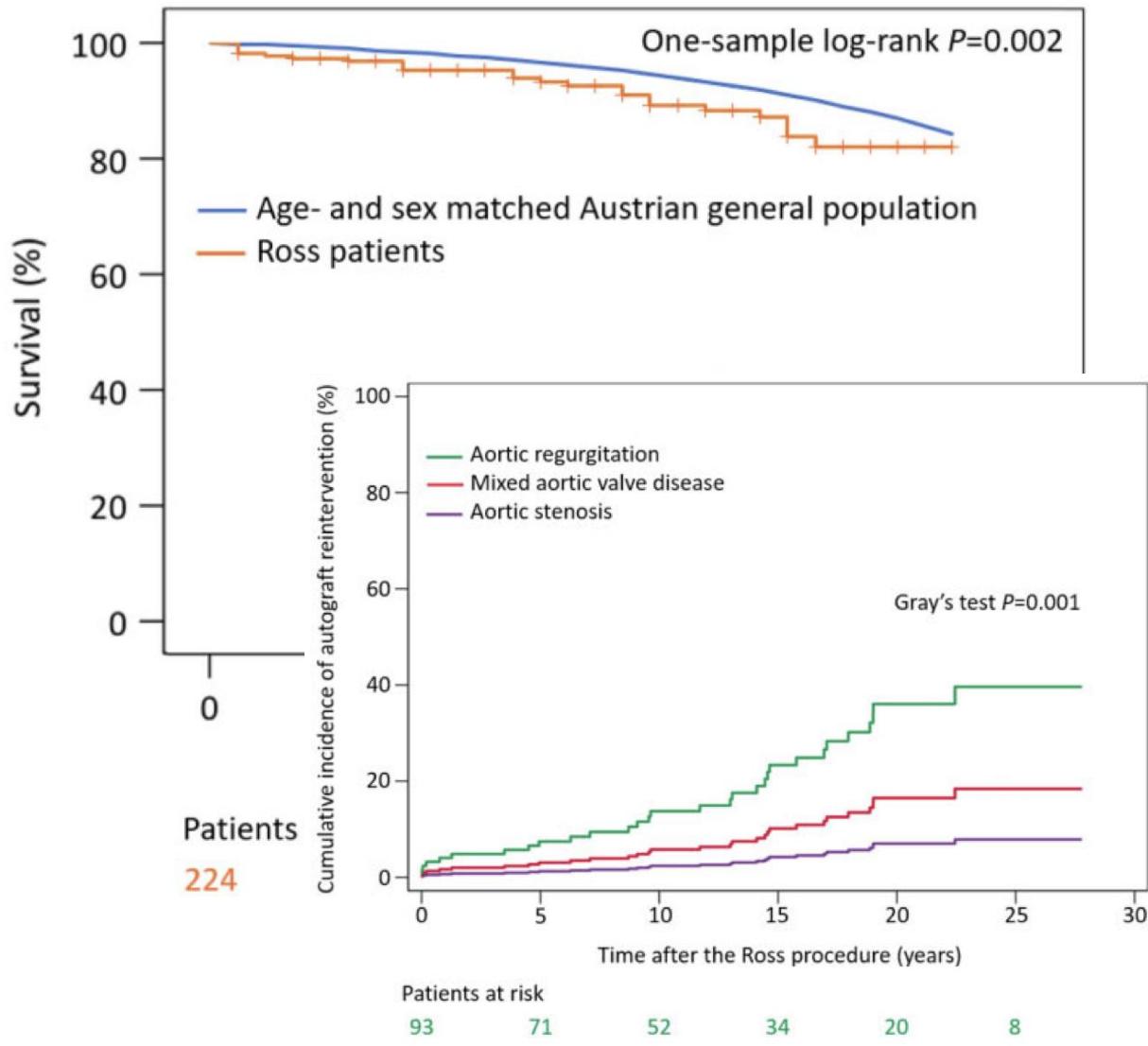


Cite this article as: Oeser C, Uyanik-Uenal K, Kocher A, Laufer G, Andreas M. The Ross procedure in adult patients: a single-centre analysis of long-term results up to 28 years. Eur J Cardiothorac Surg 2022; doi:10.1093/ejcts/ezac379.

The Ross procedure in adult patients: a single-centre analysis of long-term results up to 28 years

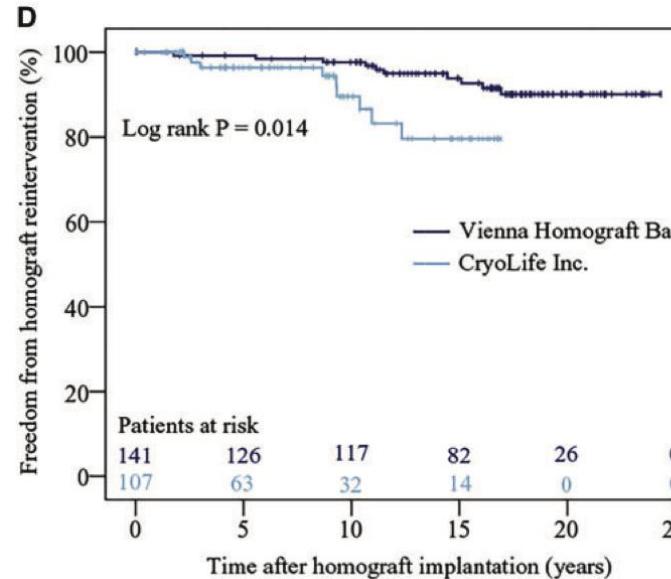
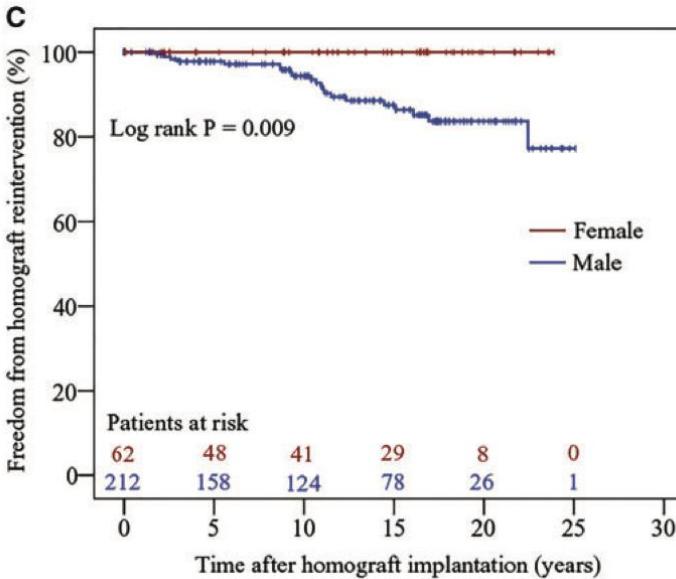
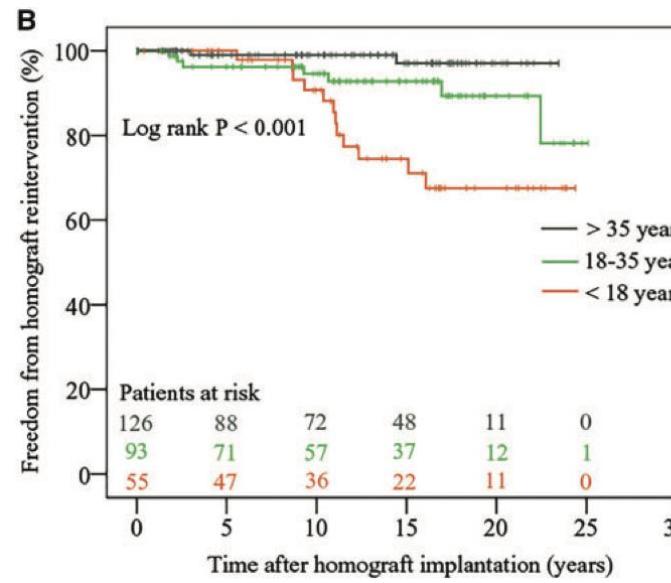
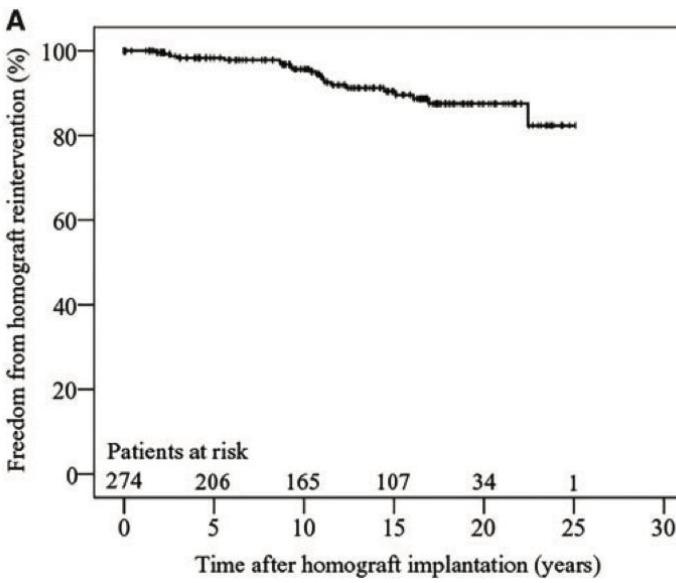
Claudia Oeser *, Keziban Uyanik-Uenal, Alfred Kocher , Guenther Laufer  and Martin Andreas 





*Bonferroni-adjusted; ^awith the remnant aortic wall and/or with a Vicryl® mesh

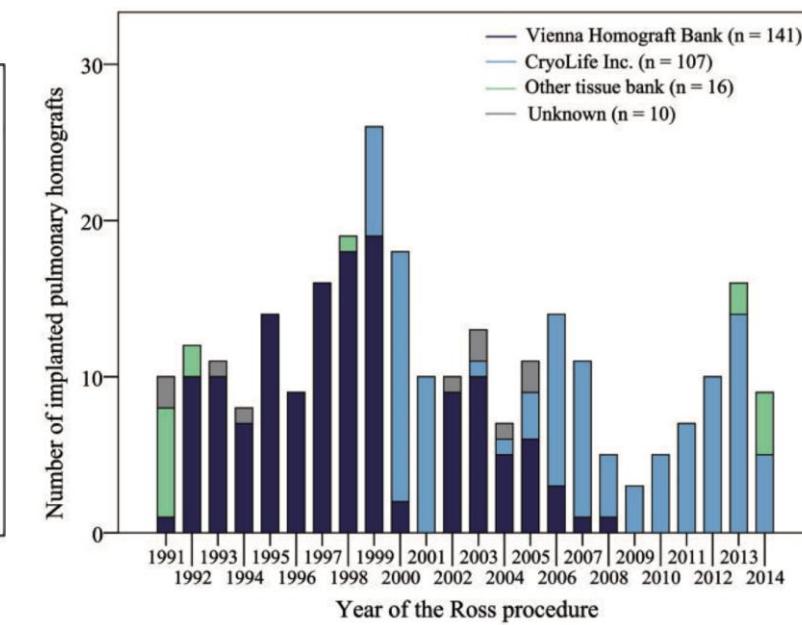
CI: confidence interval; h-v: high-volume; I-v: Intermediate-volume; L-v: Low-volume; sHR: subdistribution hazard ratio; vs: versus



Langzeit - Haltbarkeit

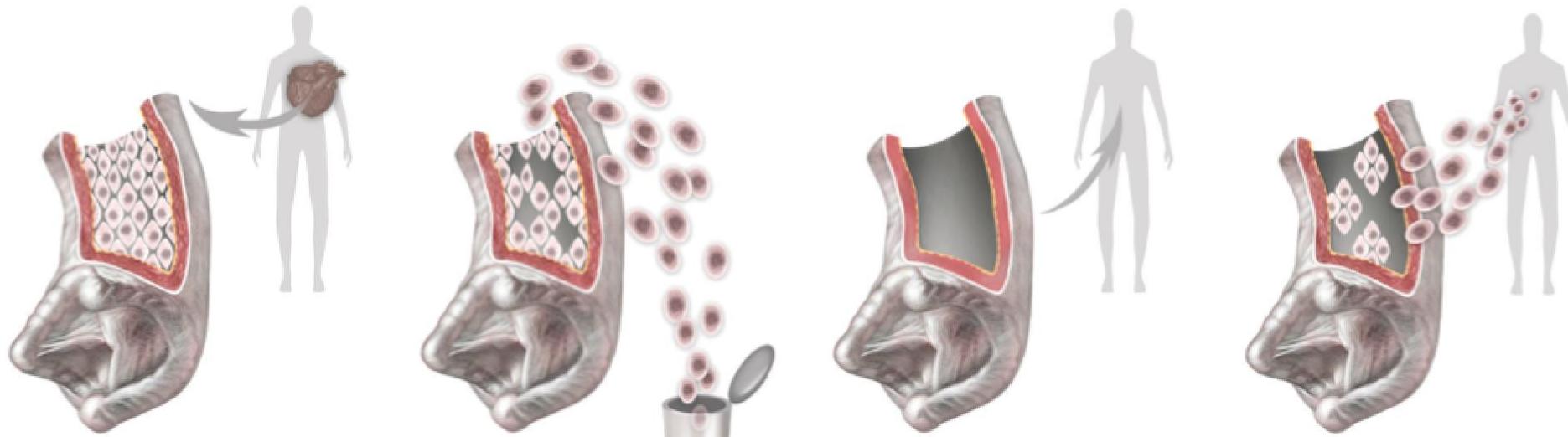
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2019



Oeser C, Uyanik-Uenal K, Kocher A, Laufer G, Andreas M. Long-term performance of pulmonary homografts after the Ross procedure: experience up to 25 years. Eur J Cardiothorac Surg. 2019 May 1;55(5):876-884. doi:

Transplantation einer dezellularisierten Herzklappe

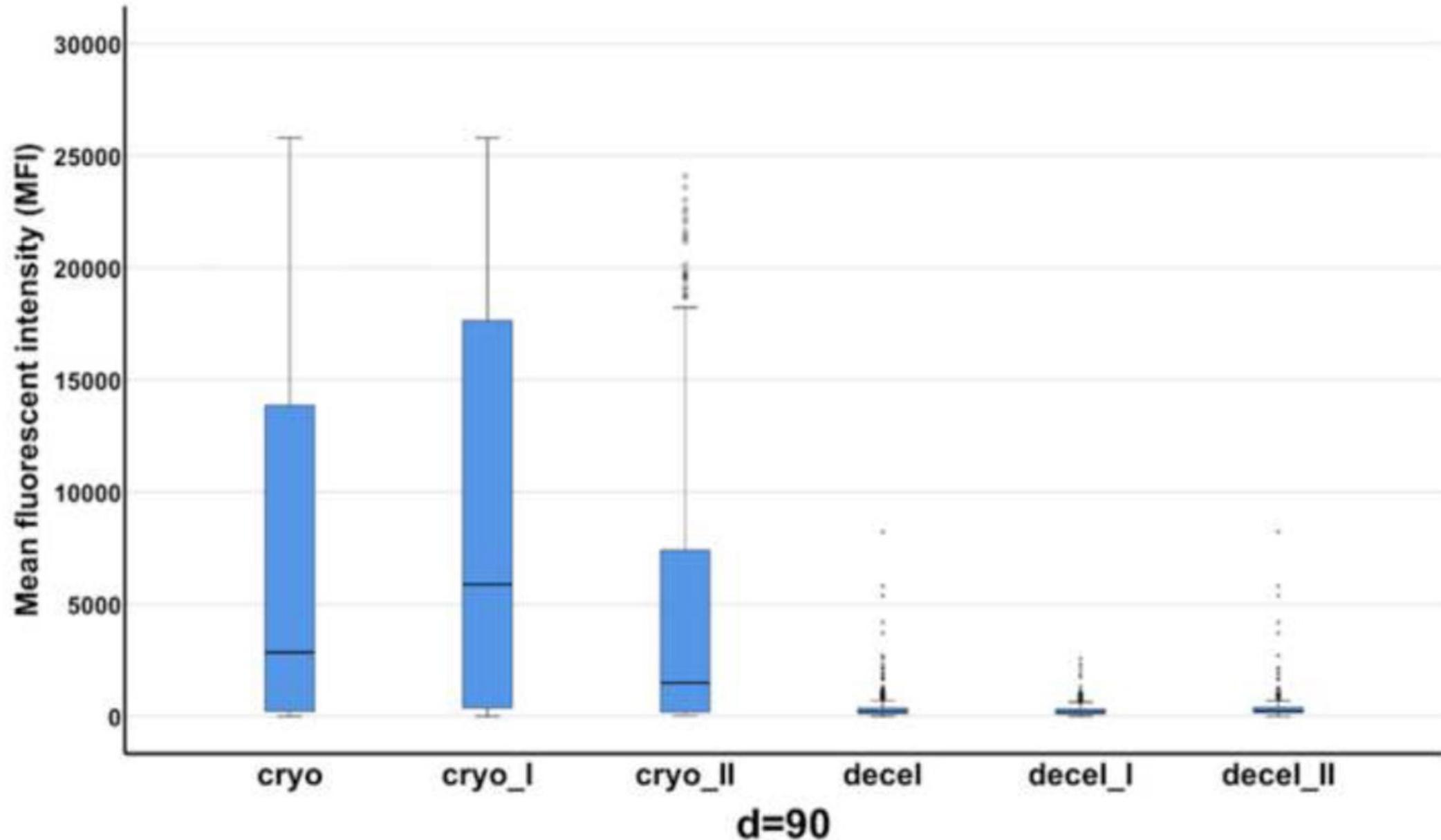


Herzklappe
(AKH)

Dezellularisierung
corlife

dezellularisierte
Herzklappe
(AKH)

Spontane
Rebesiedlung
(Patient/in)



Cite this article as: Andreas M, Oeser C, Kocher A, Laufer G. The Ross procedure in 2021—aiming for operative perfection. Eur J Cardiothorac Surg 2021;60:1122–3.

The Ross procedure in 2021—aiming for operative perfection

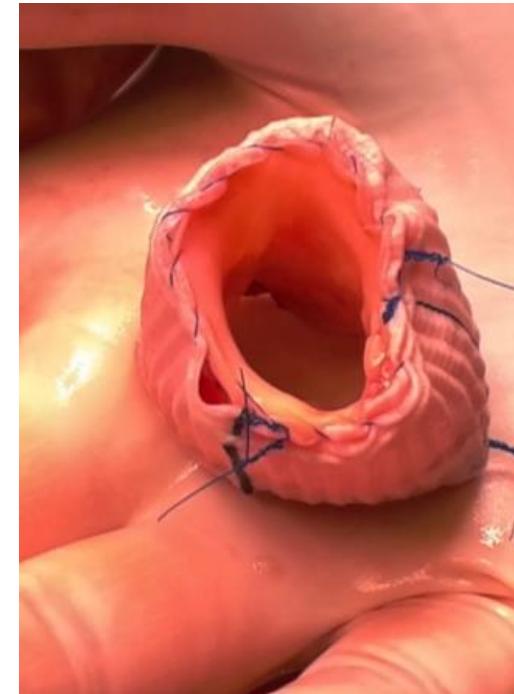
Martin Andreas *, Claudia Oeser, Alfred Kocher  and Guenther Laufer 

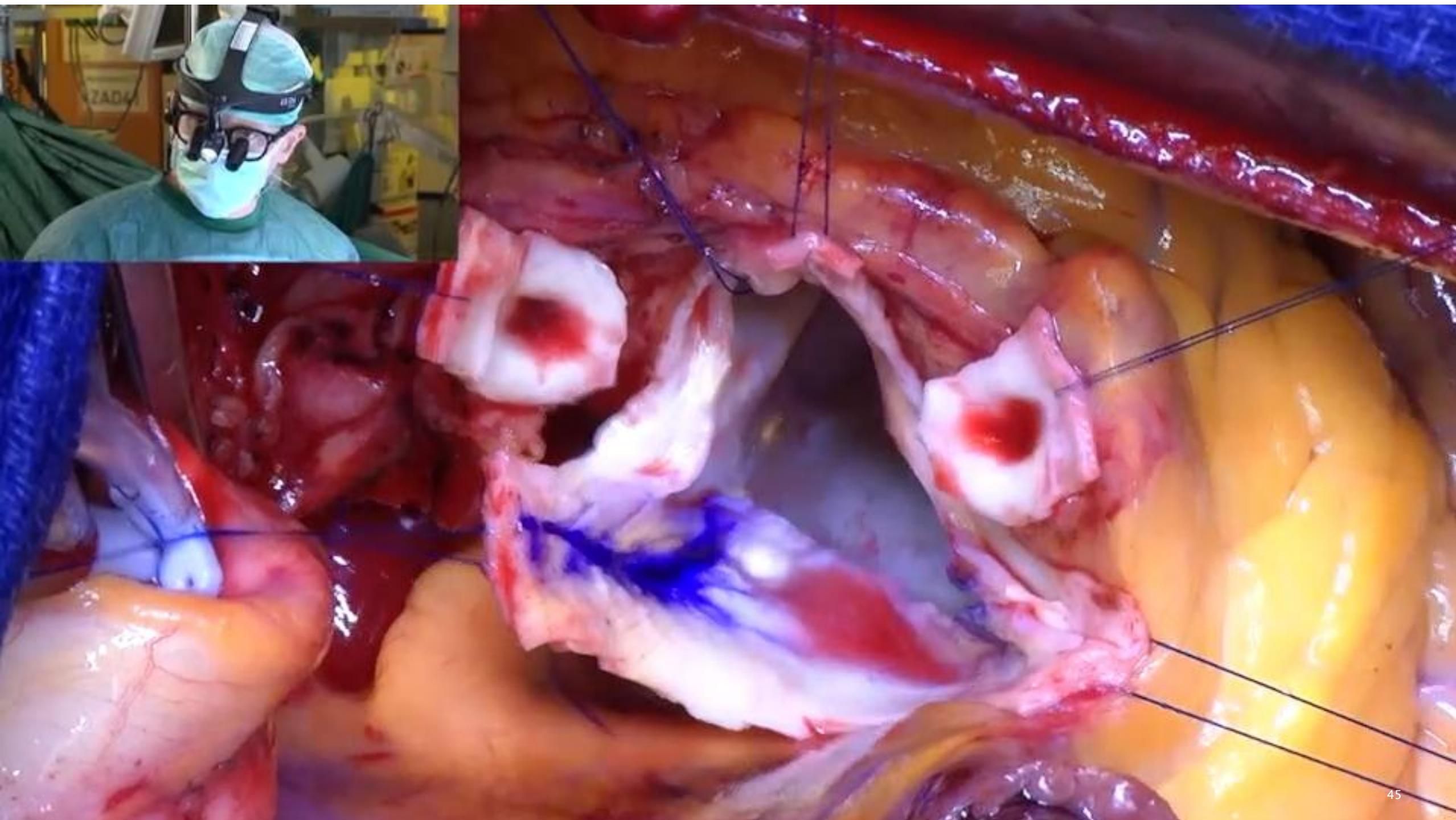
Division of Cardiac Surgery, Department of Surgery, Medical University of Vienna, Vienna, Austria

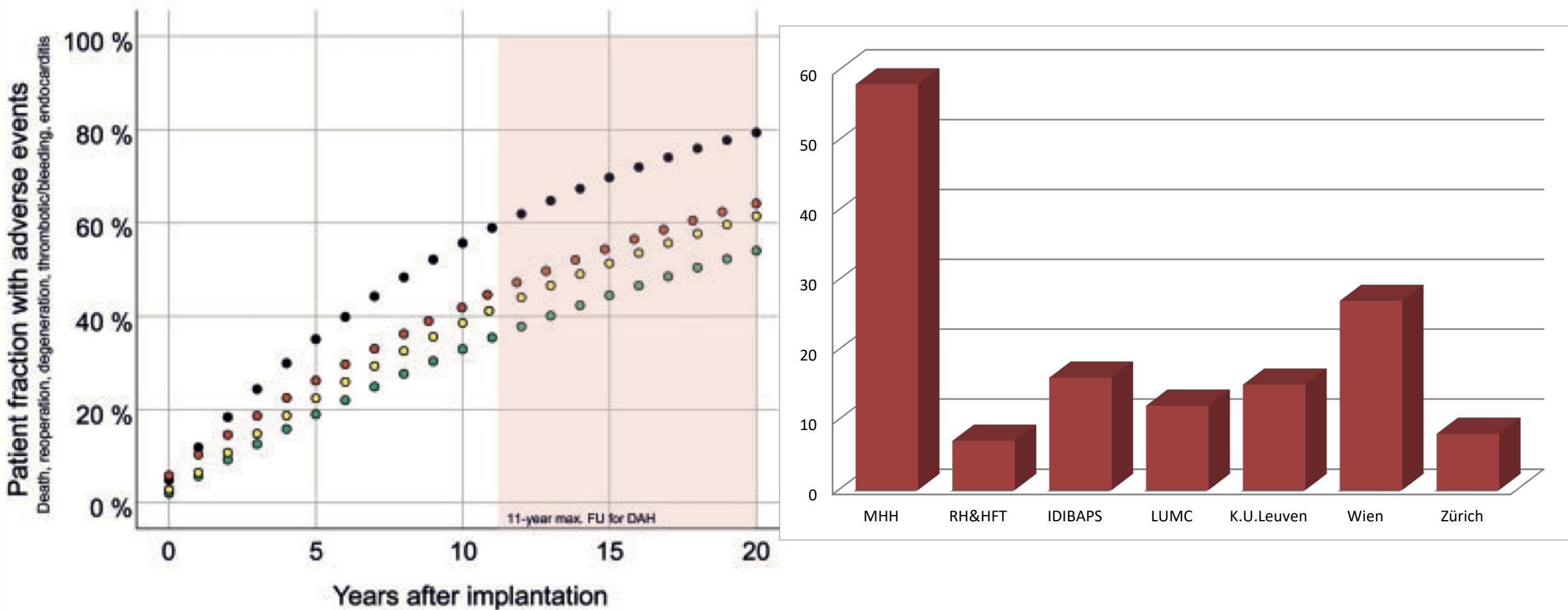
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2021

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e-mail: martin.andreas@meduniwien.ac.at (M. Andreas).







Early results from a prospective, single-arm European trial on decellularized allografts for aortic valve replacement: the ARISE study and ARISE Registry data.

Horke A, Tudorache I, Laufer G, **Andreas M**, Pomar JL, Pereda D, Quintana E, Sitges M, Meyns B, Rega F, Hazekamp M, Hübler M, Schmiady M, Pepper J, Rosendahl U, Lichtenberg A, Akhyari P, Jashari R, Boethig D, Bobylev D, Avsar M, Cebotari S, Haverich A, Sarikouch S.
Eur J Cardiothorac Surg. 2020 May 9. pii: ezaa100. doi: 10.1093/ejcts/ezaa100.

Results – Follow-up

- **No cases** of non-structural dysfunction, reoperation with valve explantation, valve endocarditis or thrombosis were observed.
- **Freedom from re-intervention was 100%.**
- **Survival is 98.6%.**

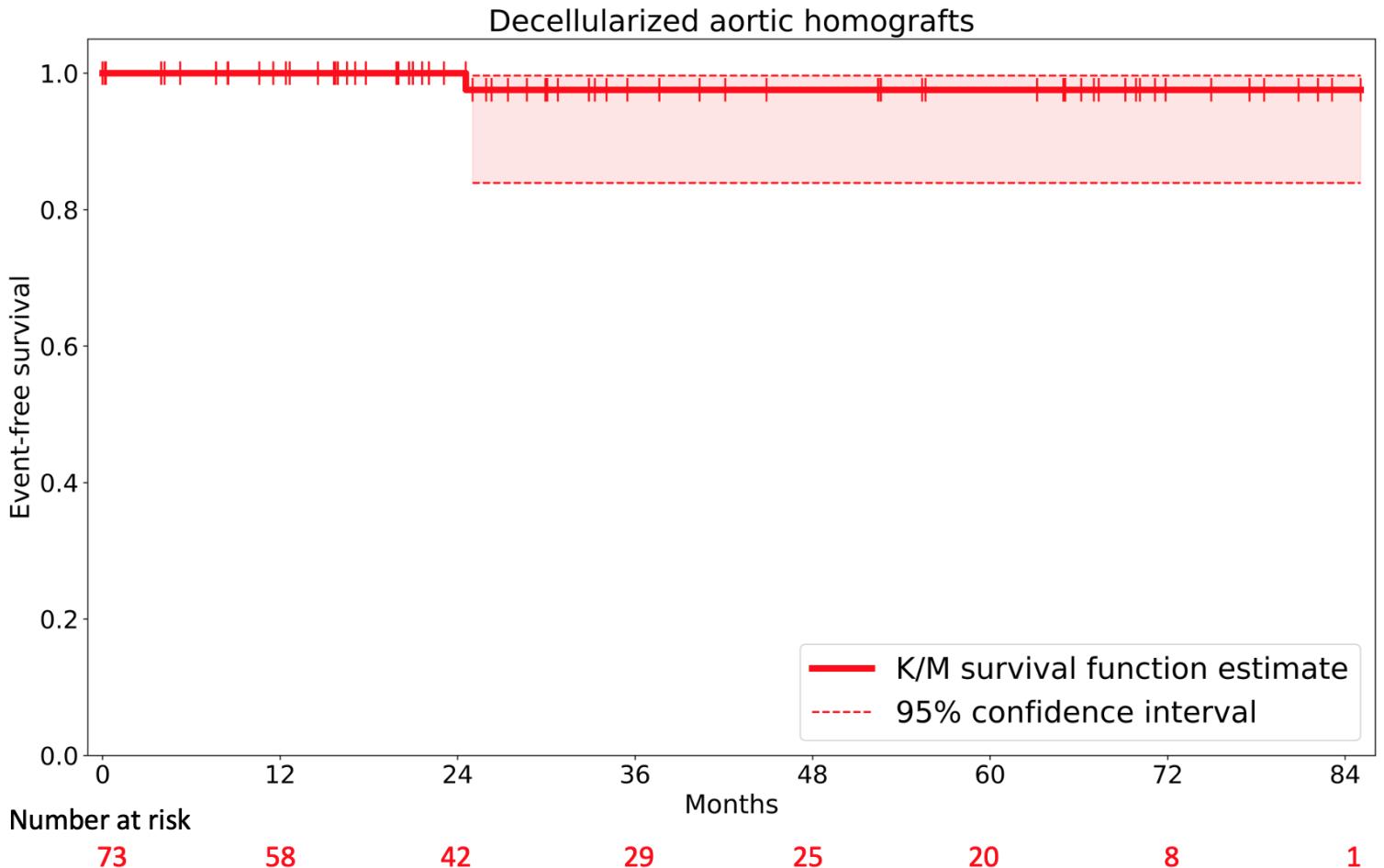


Figure 1. Kaplan-Meier event-free survival curve for the composite endpoint.

ARISE – Published Results

Early results from a prospective, single-arm European trial on decellularized allografts for aortic valve replacement: the ARISE study and ARISE Registry data 

Alexander Horke, Igor Tudorache, Günther Laufer, Martin Andreas, Jose L Pomar,

Daniel Pereda, Eduard Quintana, Marta Sitges, Bart Meyns, Filip Rega ... Show more

Author Notes

European Journal of Cardio-Thoracic Surgery, Volume 58, Issue 5, November 2020, Pages 1045–1053, <https://doi.org/10.1093/ejcts/ezaa100>

	ARISE study cohort (<i>N</i> = 144)	All DAH (<i>N</i> = 223)	Vienna (<i>N</i> = 73)
Implantation period	2015–2018	2008–2019	2016-2023
Age at implantation (years), mean (SD)	33.6 (20.8)	28.7 (19.8)	47.0 (11.3)
Follow-up (years), mean (SD)	1.54 (0.81)	2.60 (2.13)	2.9 (2.2)
Total follow-up (years), <i>n</i>	222	581	215
Male gender, <i>n</i> (%)	99 (69)	151 (68)	52 (71)

Cite this article as: Andreeva A, Werner P, Coti I, Kocher A, Laufer G, Ehrlich M et al. Decellularized aortic homografts versus mechanical composite grafts for aortic root replacement. Eur J Cardiothorac Surg 2024; doi:10.1093/ejcts/ezae314.

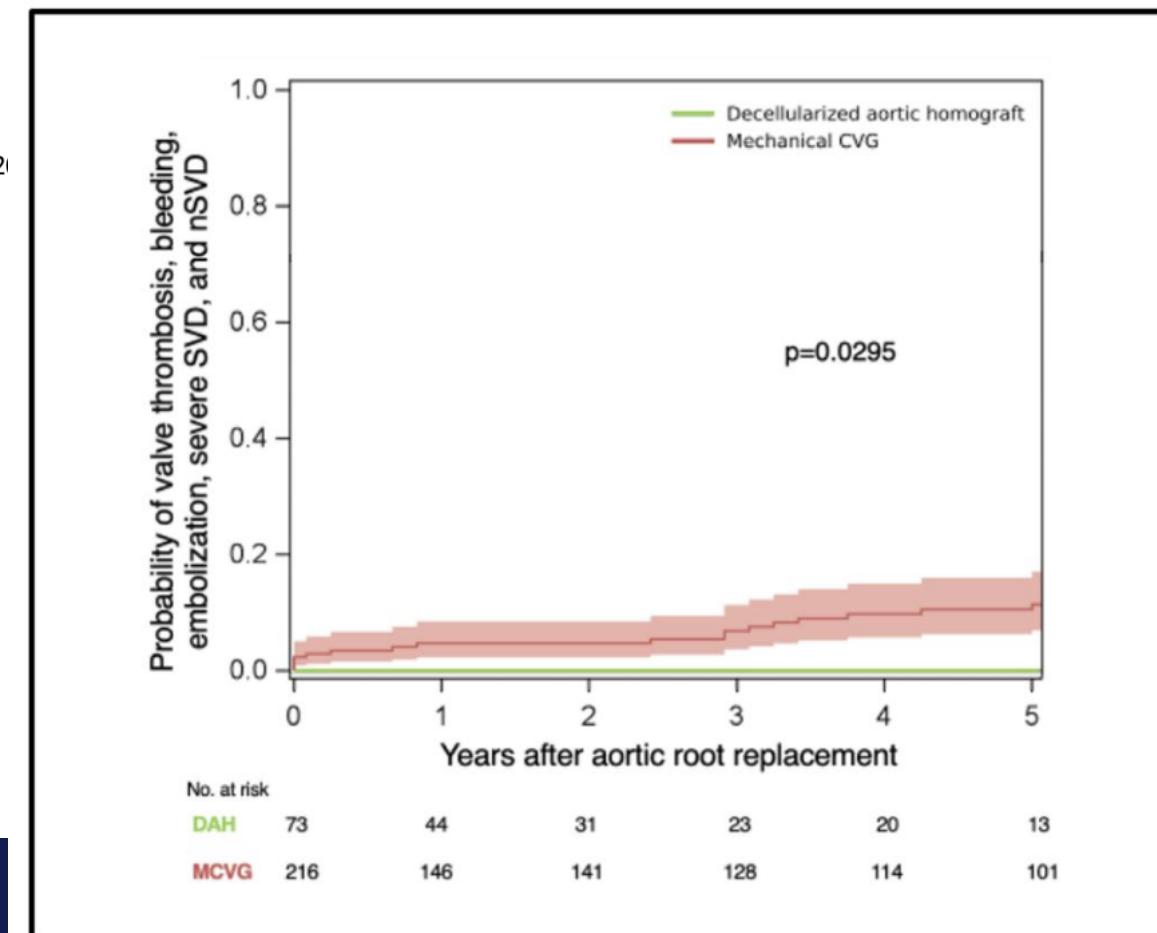
Decellularized aortic homografts versus mechanical composite grafts for aortic root replacement

Alexandra Andreeva *,[†], Paul Werner , Iuliana Coti , Alfred Kocher , Guenther Laufer , Marek Ehrlich, Daniel Zimpfer  and Martin Andreas 

Department of Cardiac Surgery, Medical University of Vienna, Vienna, Austria

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e-mail: alexandra.andreeva@meduniwien.ac.at (A. Andreeva).

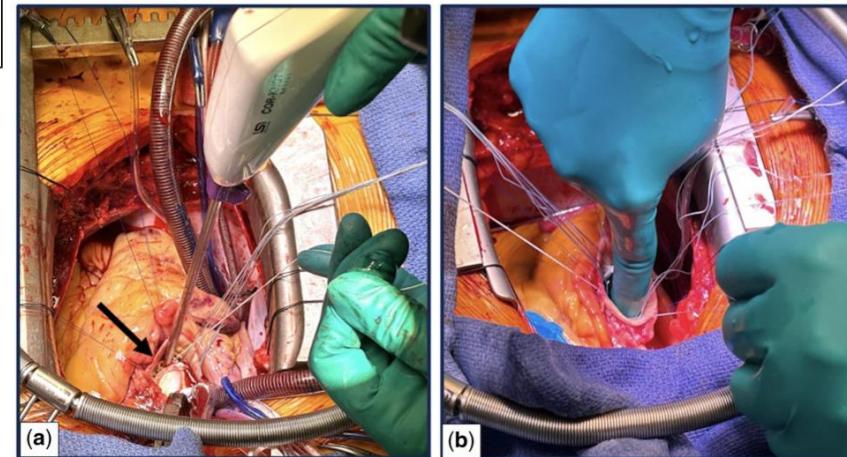
Received 27 March 2024; received in revised form 23 July 2024; accepted 21 August 2024



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Automated titanium fastener for surgical aortic valve replacement—preventive role for infective endocarditis?

Amila Kahrović *, Harald Herkner^b, Philipp Angleitner , Paul Werner , Alfred Kocher , Marek Ehrlich^a, Dominik Wiedemann , Guenther Laufer , Paul Simon^a and Martin Andreas 

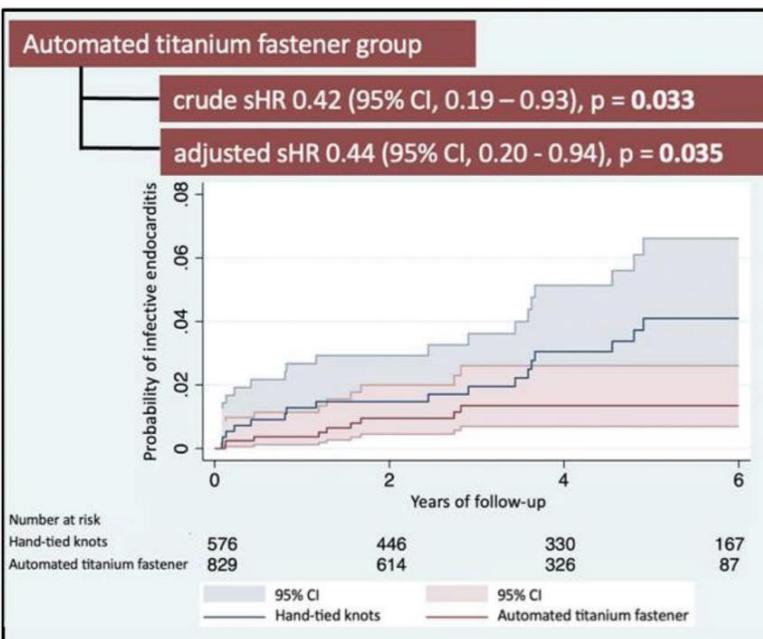


Summary

Study population: 1405 patients with SAVR were grouped based on the suture-securing technique:
-automated titanium fastener group: n= 829 (59%)
- hand-tied knots group: n= 576 (41%)

Primary study endpoint: Infective endocarditis during follow-up

Key finding: The use of an automated titanium fastener device was associated with a lower risk of infective endocarditis during follow-up.



Zusammenfassung

- Minimal- und Mikroinvasive Chirurgie – State of the Art
- Neue Klappentechnologie verbessert das Outcome
- Ross – Operation und dezellularisierte Homografts für junge PatientInnen
- Ausbildung und Qualitätssicherung essentiell für exzellente Outcomes