

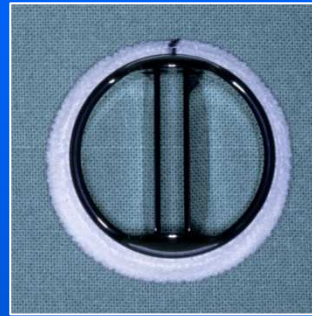
Aortic Valve Preservation / Reconstruction for AI

H.-J. Schäfers

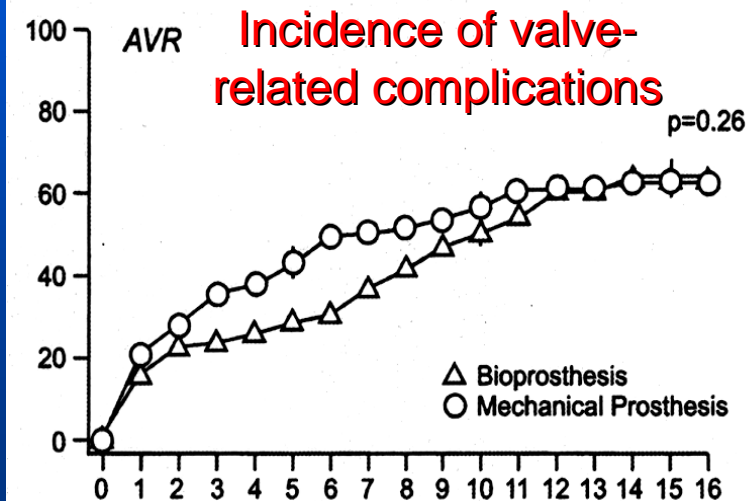
Dept. of Thoracic and Cardiovascular Surgery
University of Saarland Medical Center, Homburg/ Saar, Germany



Aortic Valve Replacement



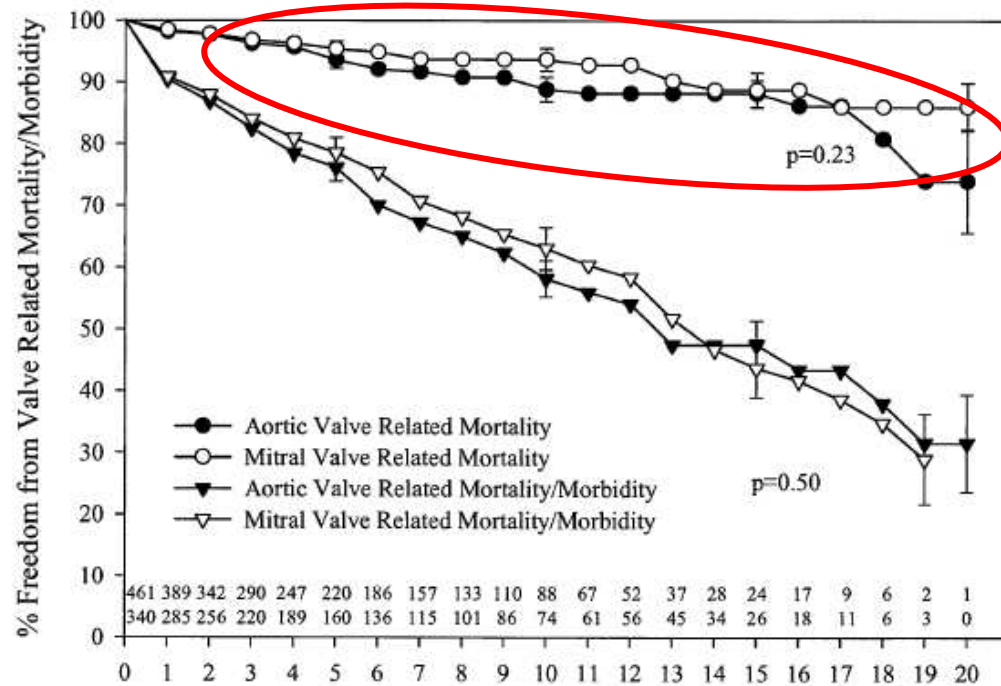
Thromboembolism
Anticoagulation/Hemorrhage
Structural failure
PV endocarditis



Hammermeister et al, JACC 2000

AVR - Mechanical

Prosthesis-related Mortality



years after valve replacement

Ikonomidis JS, JTCVS 2003



Causes of Aortic Regurgitation

A
M
A
C
M
R
In
C

Aortic Valve Repair Using a Differentiated Surgical Strategy

Frank Langer, MD; Diana Aicher, MD; Anke Kissinger, Olaf Wendler, MD; Henning Lausberg, MD;
Roland Fries, MD; Hans-Joachim Schäfers, MD

Background—Reconstruction of the aortic valve for aortic regurgitation (AR) remains challenging, in part because of not only cusp or root pathology but also a combination of both can be responsible for this valve dysfunction. We have systematically tailored the repair to the individual pathology of cusps and root.

Methods—Between October 1995 and August 2003, aortic valve repair was performed in 282 of 493 patients undergoing surgery for AR and concomitant disease. Root dilatation was corrected by subcommissural plication (n=59), supracommissural aortic replacement (n=27), root remodeling (n=175), or valve reimplantation within a graft (n=24). Cusp prolapse was corrected by plication of the free margin (n=157) or triangular resection (n=36), cusp defects were closed with a pericardial patch (n=16). Additional procedures were arch replacement (n=114), coronary artery bypass graft (n=60) or mitral repair (n=24). All patients were followed-up (follow-up 99.6% complete), and cumulative follow-up was 8425 patient-months (mean, 33±27 months).

Results—Eleven patients died in hospital (3.9%). Nine patients underwent reoperation for recurrent AR (3.3%). Actuarial freedom from AR grade ≥II at 5 years was 81% for isolated valve repair, 84% for isolated root replacement, and 94% for combination of both; actuarial freedom from reoperation at 5 years was 93%, 95%, and 98%, respectively. No thromboembolic events occurred, and there was 1 episode of endocarditis 4.5 years postoperatively.

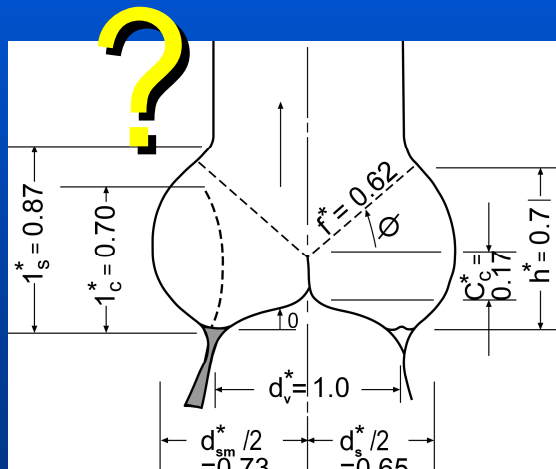
Conclusions—Aortic valve repair is feasible even for complex mechanisms of AR with a systematic and individually tailored approach. Operative mortality is low and mid-term durability is encouraging. The incidence of valve-related morbidity is low compared with valve replacement. (*Circulation*. 2004;110[suppl II]:II-67-II-73.)



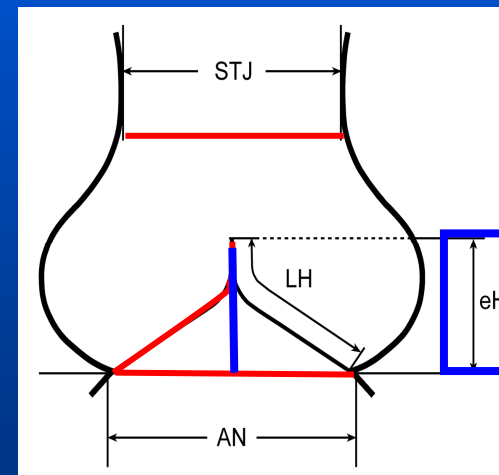
THQ

Aortic Valve Repair - Assessment

Cusp Configuration

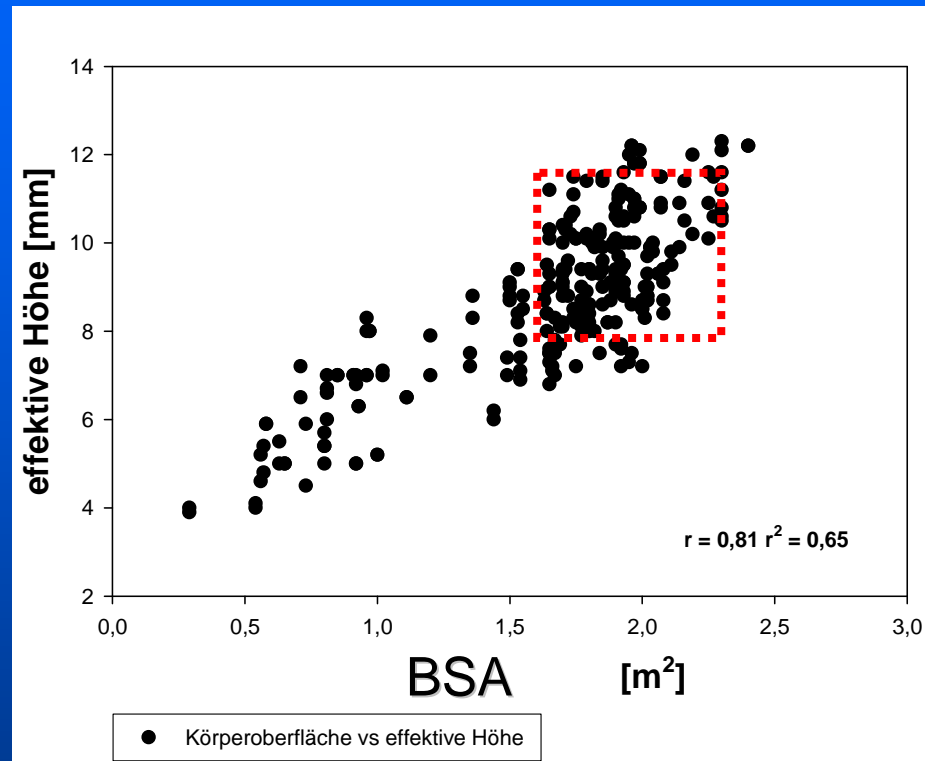


Swanson, Circ Res 1974

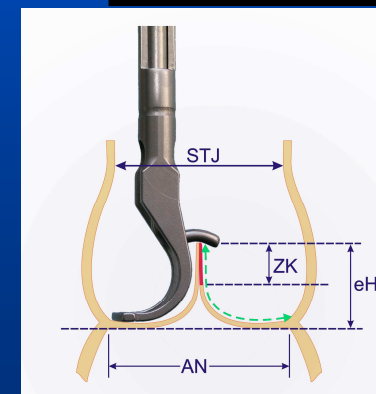
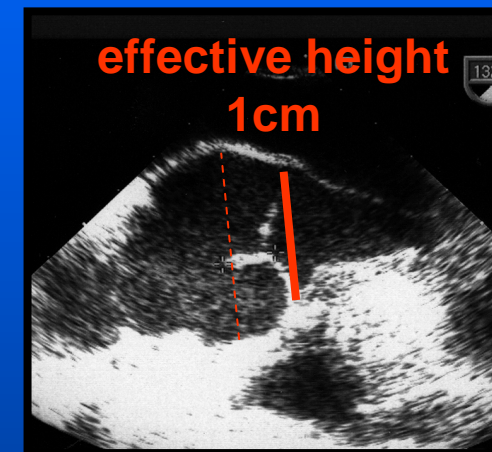
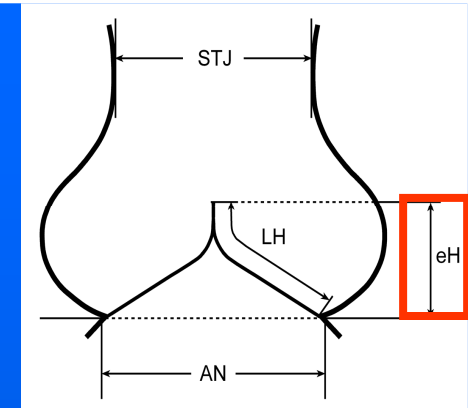


Schäfers JTCVS 2006

Effective Height

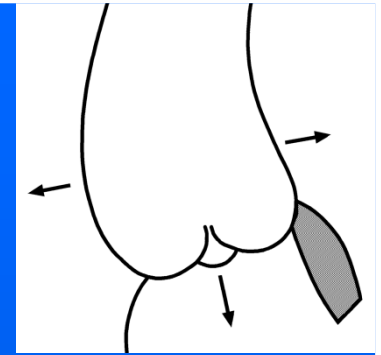


Bierbach B et al., EJCTS 2010

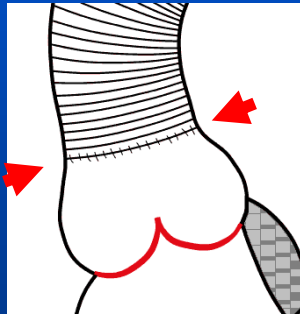


Schäfers HJ et al, JTCVS 2006

Aortic Dilatation – Technical Options

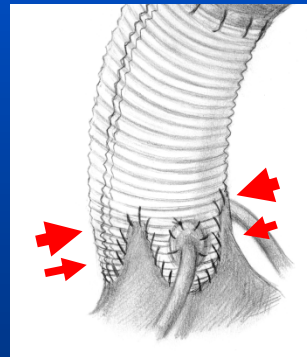


ST Junction Remodelling



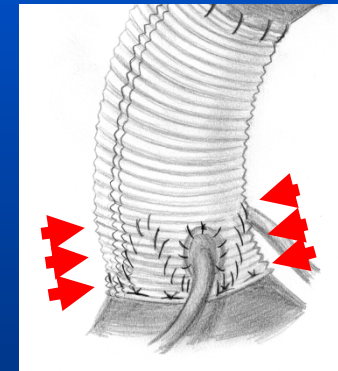
(Frater 1986)
(Sinus < 45 mm,
STJ \leq 32 (39) mm)

Root Remodeling



(Yacoub 1993)
(Sinus > 45 mm (TEE),
AVJ < 30 mm)

Reimplantation of Aortic Valve

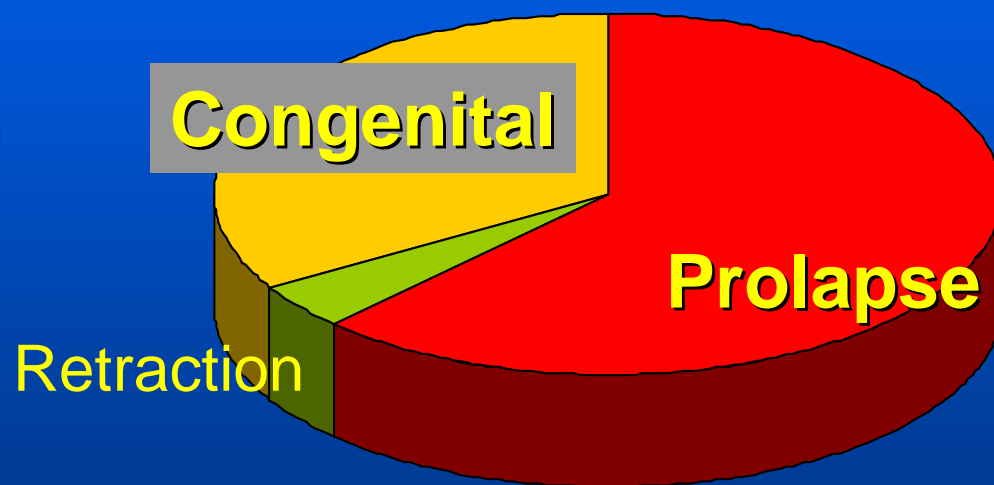


(David 1992)
(AVJ \geq 30 mm)



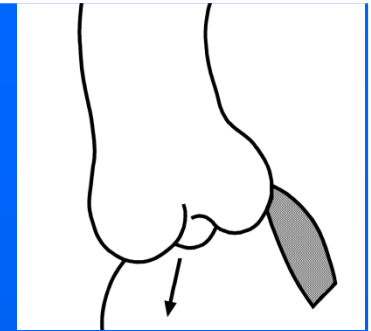
Causes of Cusp Pathology

- Prolapse $n=606/826 = 73\%$
(right > non > left-coronary cusp)
- Congenital malformation
 - bicuspid $n=276$
 - unicuspid $n=50$
 - quadricuspid $n=3$
- Retraction / Calcium $n=42$



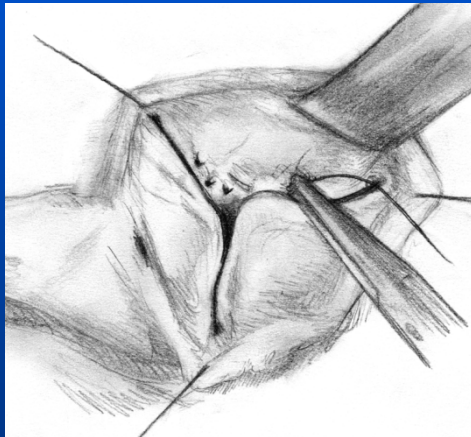
Aortic Regurgitation

Reconstructive Techniques



Cusp Pathology

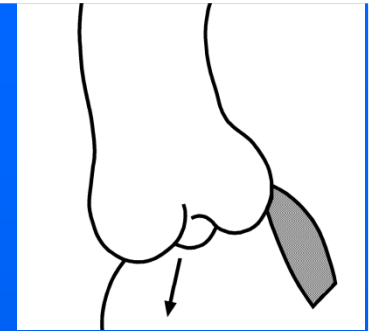
Prolapse



Plication of
Cusp Margin

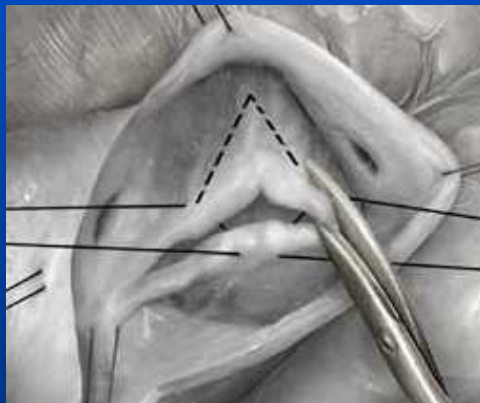


Reconstructive Techniques

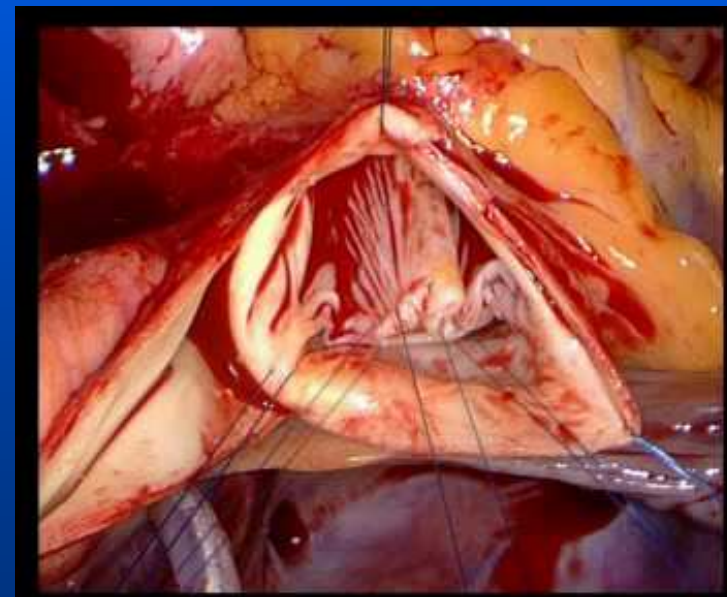


Cusp Pathology

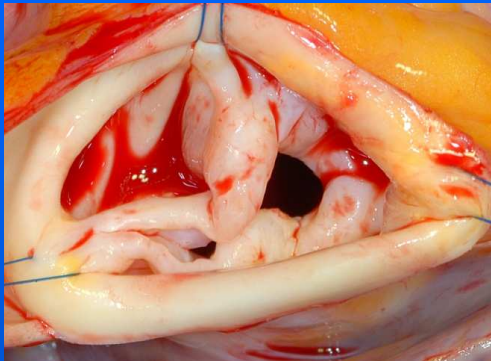
Fibrosis,
Calcium,
Redundancy



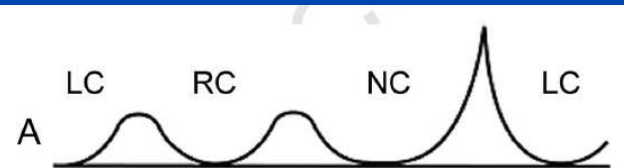
Triangular
Resection



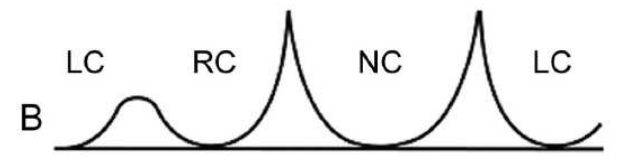
Bicuspidization of the Unicuspid Aortic Valve



unicuspid



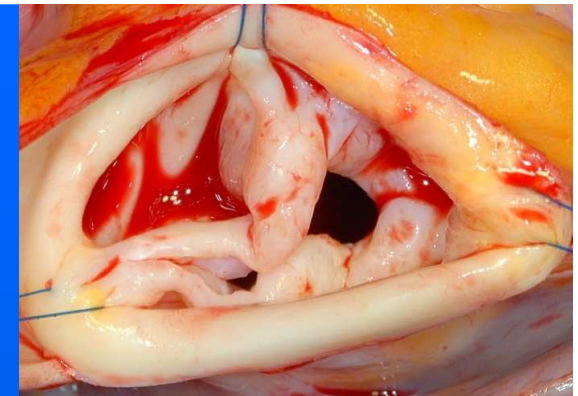
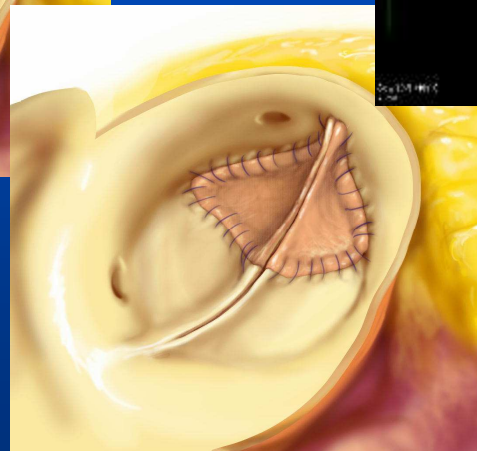
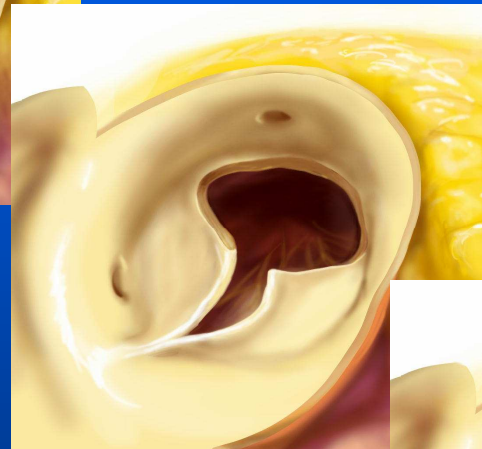
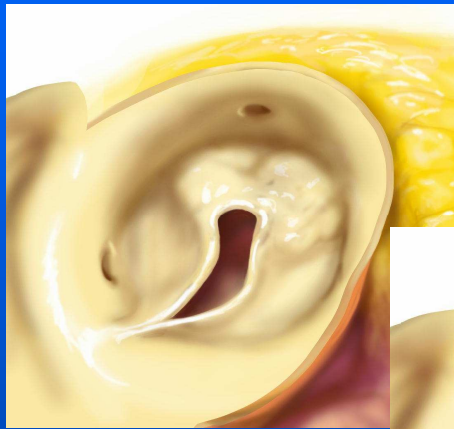
bicuspid



Anderson RA, JHVD 2001



Bicuspidization of the Unicuspid Aortic Valve II



Schäfers Ann Thorac Surg 2008



AV-Reconstruction

Patients (10/95-1/12, N=1501)

Age (yrs.)	2 – 85	(52 ± 18)
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Gender (m/f)	1147/354
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Comorbidity:

Aneurysm, chron. diss.	876
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Acute dissection	98
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CAD	226
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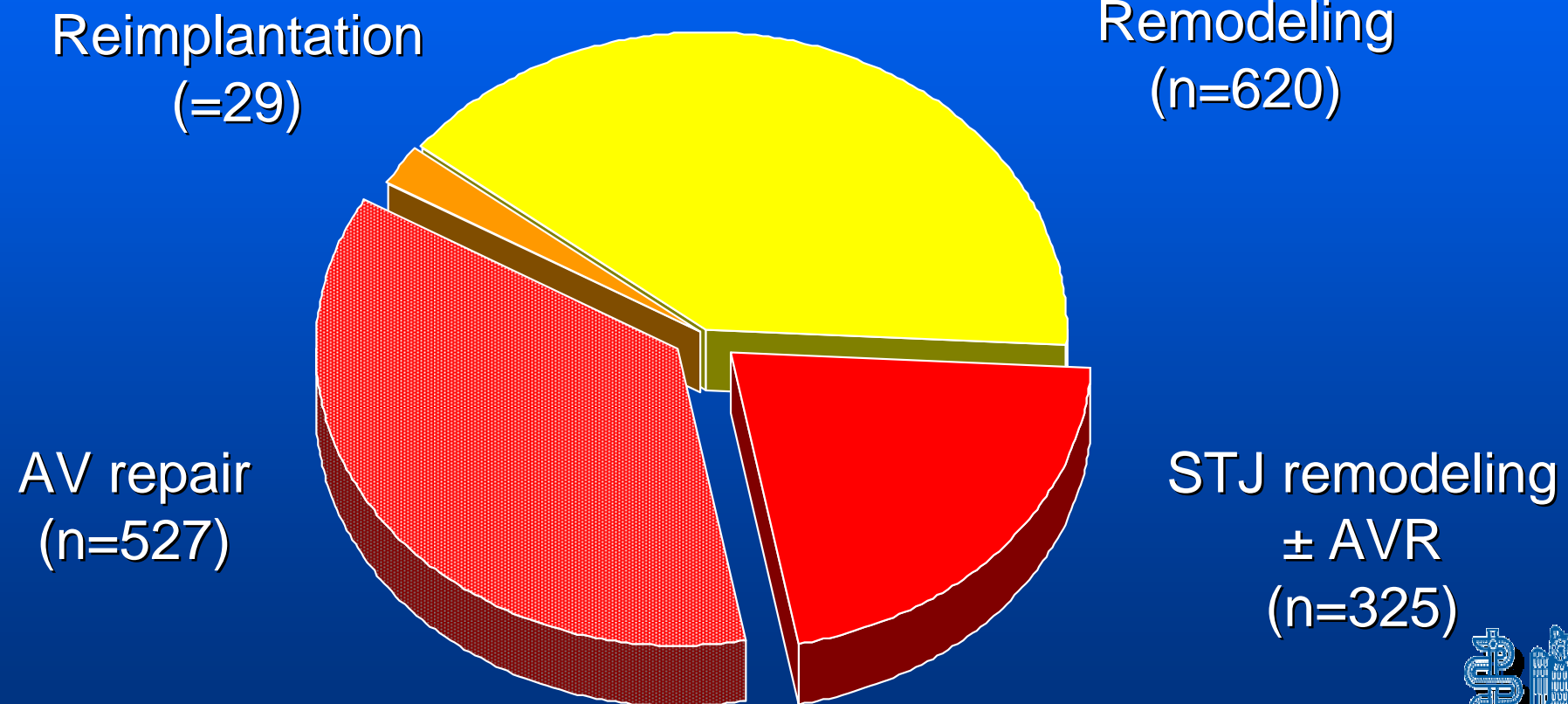
MR/TR	117 / 32
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Cong. HD	48
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LA ablation	103
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Aortic Valve Repair (10/95-1/12)

n=1501



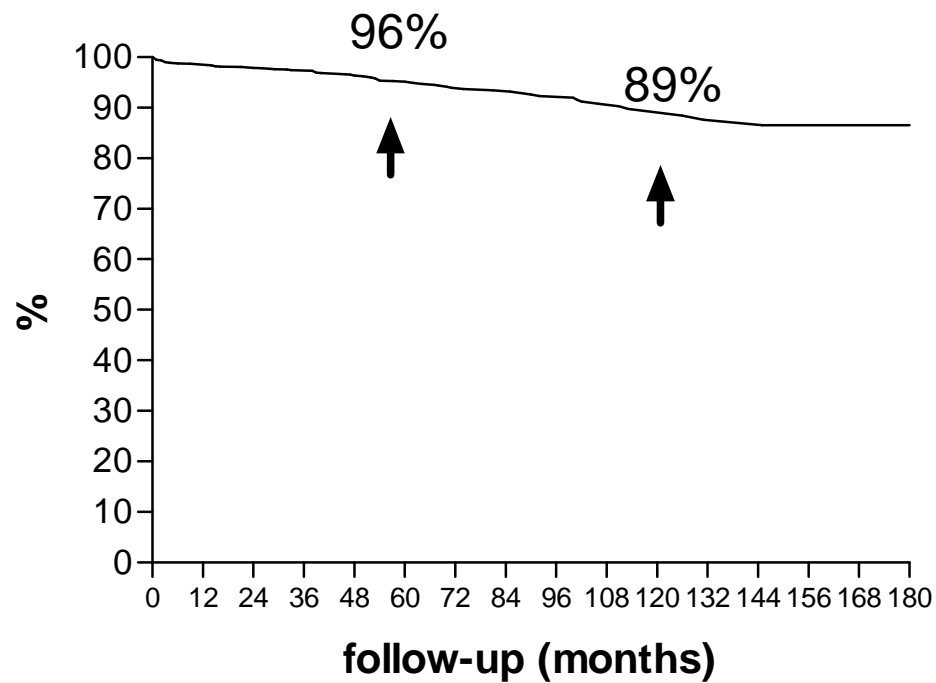
AV Reconstruction

Hospital Mortality

	AVR + Misc.	Root replacement (remod./reimplant.)	Cum.
total	12 / 852 (1.4 %)	14 / 649 (2.1 %)	26 / 1501 (1.7 %)
elective	11 / 824 (1.3 %)	10 / 579 (1.7 %)	21 / 1403 (1.5 %)
emerg.	1 / 28 (3.6%)	4 / 70 (5.7 %)	5 / 98 (5.1 %)

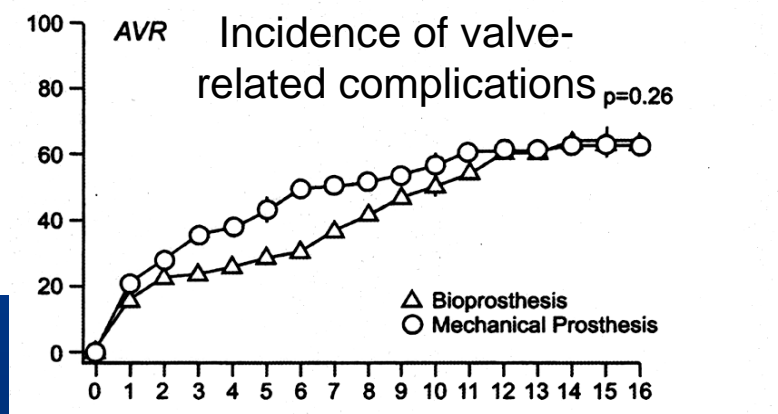
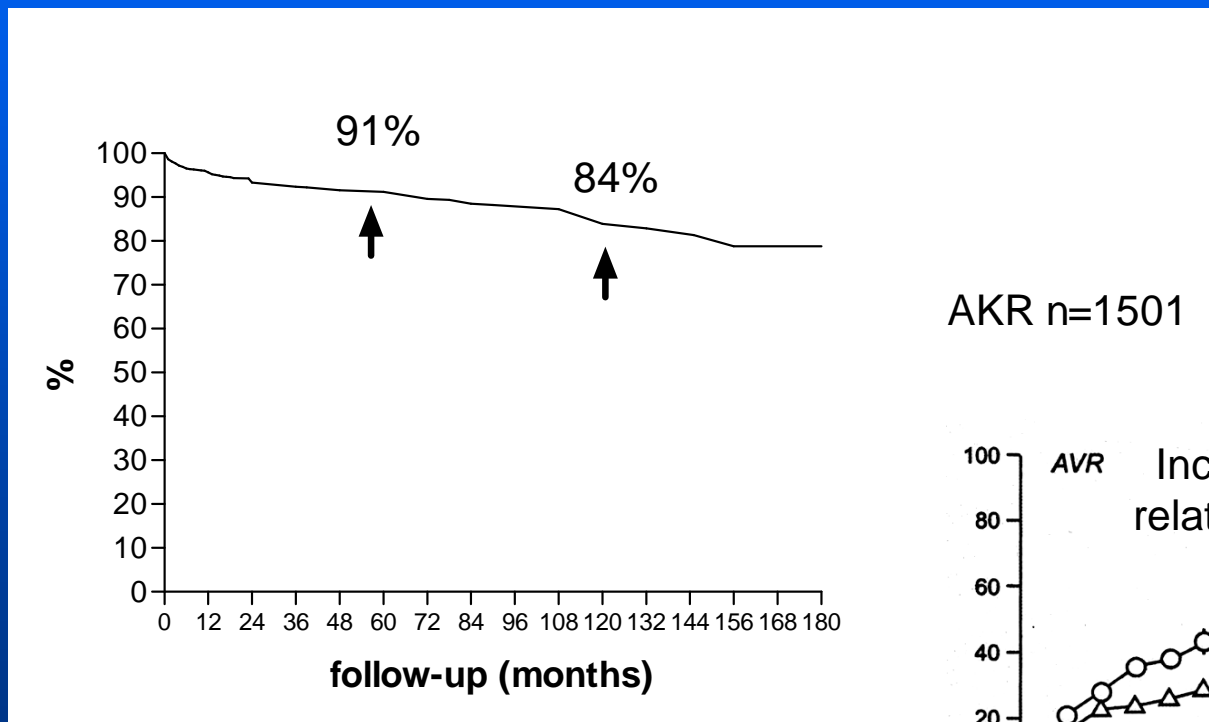
Aortic Valve Repair

Survival (n=1501)



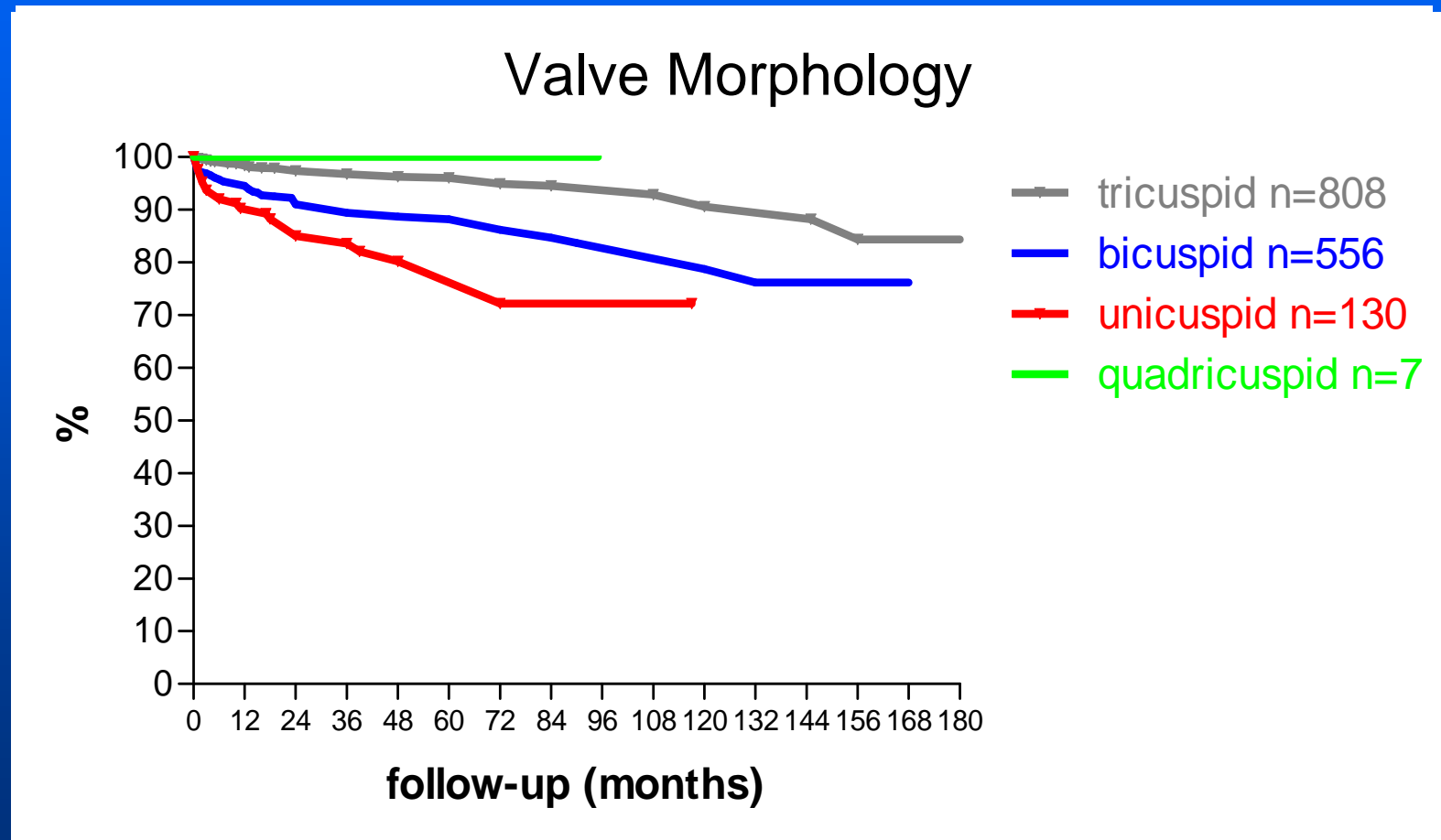
Aortic Valve Repair

Freedom from Valve-related Complications (n=1501)



Hammermeister et al, JACC 2000

Freedom from Reoperation



Quality of life after aortic valve surgery: Replacement versus reconstruction

Diana Aicher, MD,^a Annika Holz,^a Susanne Feldner, MD,^a Volker Köllner, MD,^b and Hans-Joachim Schäfers, MD^a

Objective: Quality of life (QoL) in young patients. Aortic valve surgery (AVS) and pulmonary autograft reconstruction (PAR) lead to depression after surgery and pulmonary autograft reconstruction (PAR).

Methods: In a retrospective analysis (group II, n = 100), the Health Survey (HS) and the Health Survey (HS) were used to assess the quality of life (QoL) and the Health Survey (HS) questions.

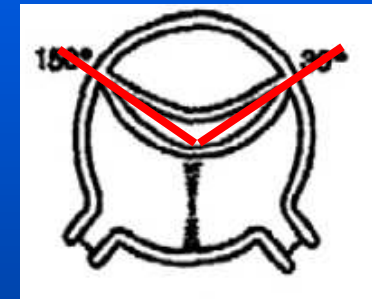
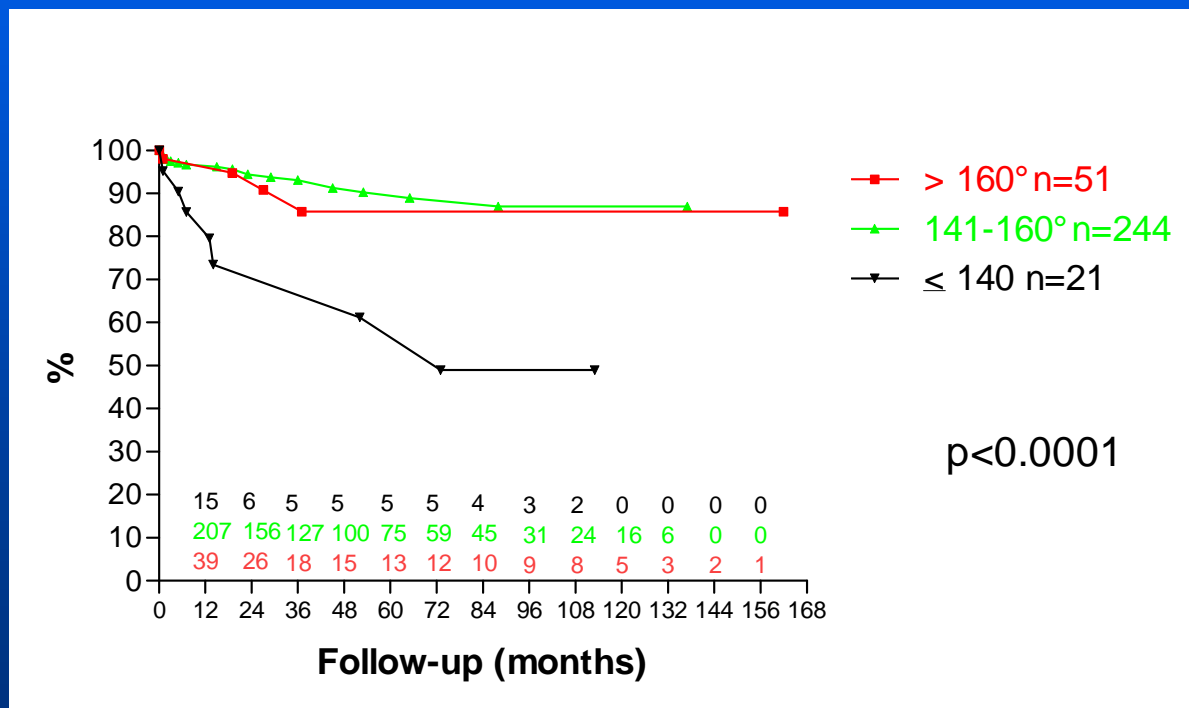
Results: In the young patients, the physical function (PF) and the physical function (PF) in Hospital Anxiety and Depression Scale (HADS) groups I and II were compared. Differences between the two groups were not significant.

Conclusions: In young patients after aortic valve surgery quality of life is influenced by type of operation. Although differences are limited, aortic valve reconstruction and pulmonary autograft replacement lead to less long-term alteration from normal values. (J Thorac Cardiovasc Surg 2011;142:e19-24)

In conclusion, all 3 investigated surgical methods led to excellent QoL and limited changes in anxiety and depression relative to published data on healthy control subjects. Interestingly, the level of depression was lower than age-matched published norms for all groups. Both aortic valve reconstruction and replacement with a pulmonary autograft resulted in a lesser degree of postoperative subjective disturbance. Further research will be needed to clarify possible reasons for the observed differences.

Valve Configuration Determines Long-Term Results After Repair of the Bicuspid Aortic Valve

Diana Aicher, MD; Takashi Kuniyara, MD; Omar Abou Issa, MD; Brigitte Brittner, MD;
Stefan Gräber, MD; Hans-Joachim Schäfers, MD



Circulation 2011



Freedom from Reoperation – all BAV

Predictors of Suboptimal Durability

	p univar.	p multivar.
Patient age < 40 yrs.	0.0051	0.001
Orientation of comm. (<160°)	0.0001	0.002
Non-root replacement	0.0018	
Cabrol suture	0.04	
Pericardial patch	0.0001	0.0001
AV diameter (>28 mm)	0.0005	0.007
ST diameter (\leq 30 mm)	0.0142	
Effective height < 9mm	0.0013	0.002
Preop AR > III	0.0029	



Anatomical Limitations of Aortic Valve Repair

Functional Anatomy of Aortic Regurgitation

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

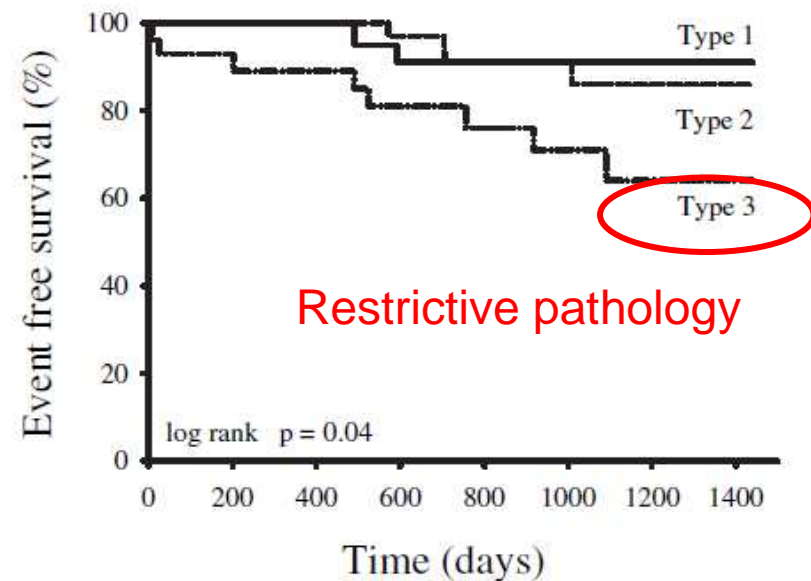
Jean-Benoît le Polain de Waroux, MD*; Anne-Catherine Pouleur, MD*; Céline Goffinet, MD; David Vancraeynest, MD; Michel Van Dyck, MD; Annie Robert, PhD; Bernhard L. Gerber, MD, PhD; Agnès Pasquet, MD, PhD; Gébrine El Khoury, MD; Jean-Louis J. Vanoverschelde, MD, PhD

Background—For patients with aortic regurgitation (AR), to valve replacement. In this setting, accurate pre-repairability is of paramount importance. The aim of the transesophageal echocardiography (TEE) in defining the mechanism of AR in predicting repairability, by using the final surgical approach.

Methods and Results—One hundred and sixty-three consecutive AR surgery were included. Mechanisms of AR were classified as type 1, aortic dilatation; type 2, cusp prolapse; and type 3, restrictive pathology. AR were type 1 in 41 patients, type 2 in 62, and type 3 in 60 (κ=0.90). Valve sparing or repair was performed in 118 patients. TEE predicted the final surgical approach in 108/125 (86%) patients undergoing replacement. The gross anatomic classification and postoperative outcome (4-year freedom from > 50% aortic regurgitation).

Conclusions—TEE provides a highly accurate anatomic classification of AR. The anatomy of AR defined by TEE is strongly and independently associated with the postoperative outcome. (*Circulation*. 2007;116[suppl 1]:I-264-I-269)

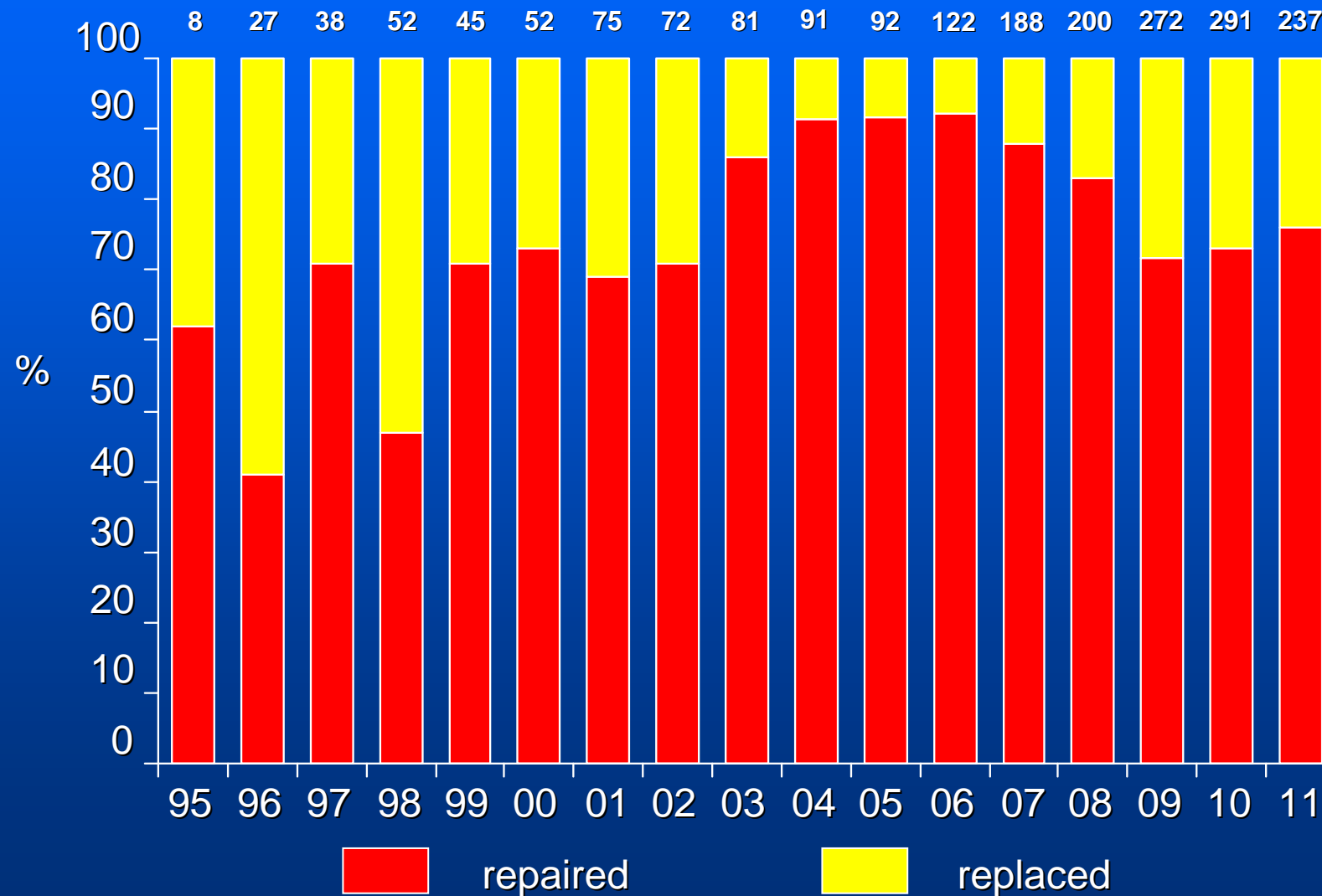
Key Words: echocardiography ■ surgery ■



—	n = 36	22	16	8
—	n = 55	37	18	10
—	n = 30	24	14	8

Figure 4. Kaplan-Meier estimates of event-free survival in patients undergoing valve sparing or repair surgery, according to anatomic classification by TEE.

AI – Repair vs. Replacement UKS Homburg



Conclusions

Reconstruction of the Aortic Valve

- Similar to mitral repair: systematic analysis + correction
- Many strategies defined
- Low risk of valve-related complications

Cave: specific valve pathologies may lead to suboptimal
Durability

➡ Aortic valve repair should be considered for every
aortic regurgitation (consider alternatives)!