



**UKS**  
Universitätsklinikum  
des Saarlandes

Reconstruction of the Aortic Valve and Root  
A Practical approach

# Failures after aortic valve repair

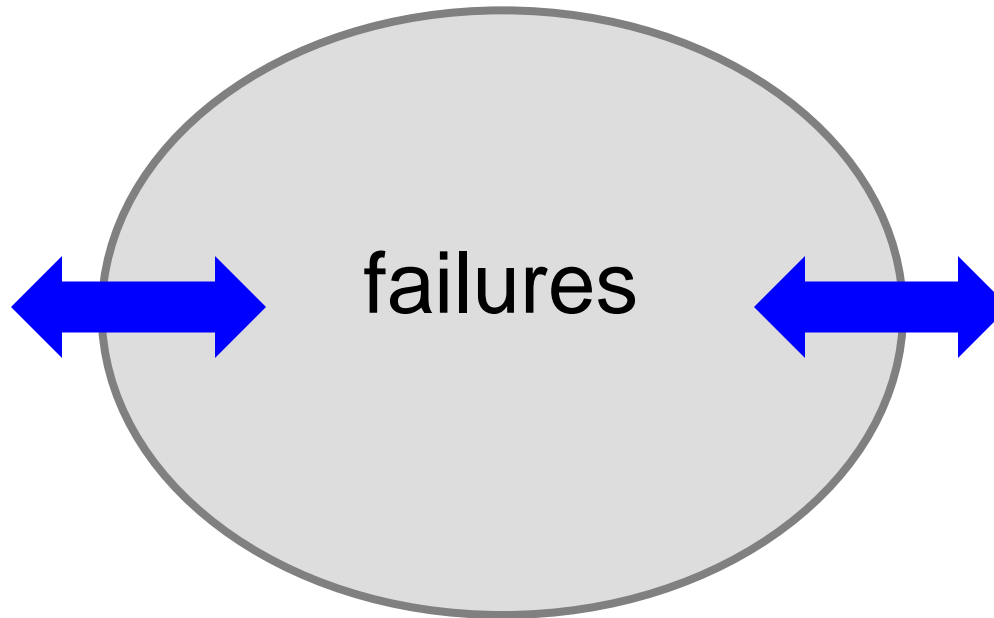
Diana Aicher

September 16<sup>th</sup>-18<sup>th</sup> 2015



## Classification of failures- root repair 51/810

acute/  
intraoperative  
conversions  
n=1



chronic  
n=50  
(1-184 months  
postoperatively)



## Patient Cohort

### Observation period

7/1998 to 5/2014

### Patients characteristics

Age:  $44 \pm 16$  years

Sex: 43 male/8 female

### Primary operation

Root remodeling n=45 [45/ 781 =6%];  
acute dissection n=1/62

Reimplantation n=6 [6/29= 21%],  
acute dissection n=3/7

### Re-operation

Valve morphology:	tricuspid	n= 19	(37%)
	bicuspid	n= 27	(53%)
	unicuspid	n= 5	(10%)

interval between initial aortic valve repair and reoperation: 1-184 months  
( mean:  $44 \pm 50$  months)

## Causes for chronic failure after root repair (n=50)

endocarditis	n=6	
secondary stenosis	n=6 (bicuspid n=4; tricuspid n=2)	
Secondary cusp retraction	n=4	
VSD	n=2	
recurrent regurgitation	n=32	
Cusp prolapse		n=19
rupture of a Trusler suture		n=2
recurrent dissection		n=1
annular dilatation		n=3
retraction/aortitis		n=1
suture dehiscence after pericardial patch implantation		n=4
suture dehiscence after triangular resection		n=2



## Results of Reoperation

### Valve replacement (n=38/51 [75%])

- Ross-operation n=1
- mechanical valve replacement n=9
- biological valve replacement n=28

### Re-repair (n=13/51 [ 25%])

VSD closure n=2

Valve-Re-Repair n=11

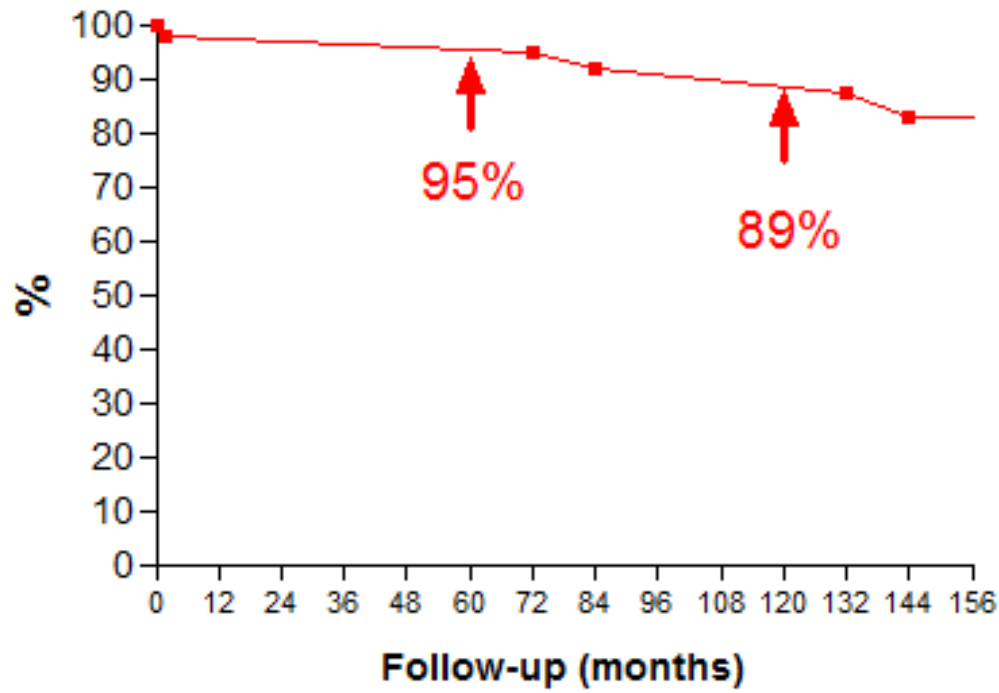
### Valve –related complications:

2 pacemaker implantation (AV-block)

1 TIA (6 months postop.)

# Survival after Reoperation

Hospital mortality 2/51 = 4%





## Causes and management of aortic valve regurgitation after aortic valve reimplantation

Christian Giebels, MD, Diana Aicher, MD, Takashi Kuniyama, MD, PhD, Svetlana Rodionychewa, MD, Wolfram Schmied, Dipl Psych, and Hans-Joachim Schäfers, MD

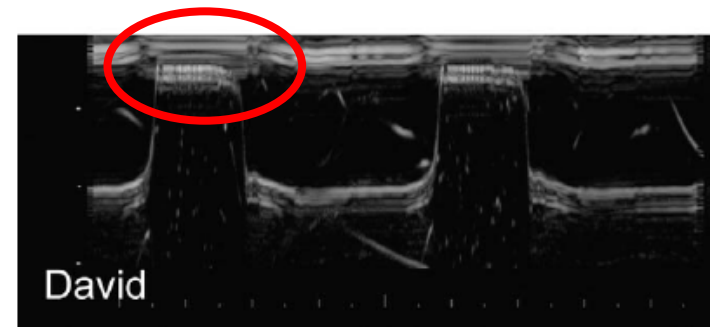
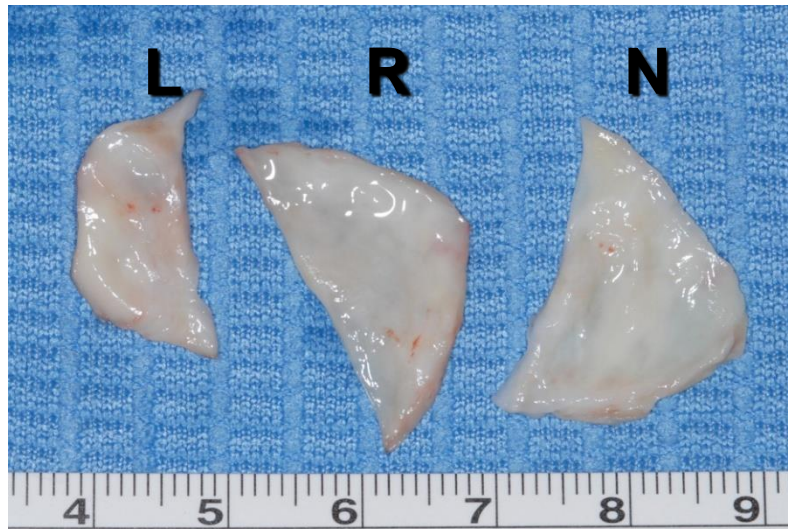
Reoperations	n=13
recurrent regurgitation	n=11
endocarditis	n=2
Cusp prolapse	n=6
Cusp perforation	n=6
Insufficient commissural height	n=5
Secondary cusp retraction	n=4
Commissural dehiscence	n=2
Inadequate valve configuration	n=1

n=6 primarily operated in Homburg  
n=7 primarily operated in other hospitals

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### Secondary cusp retraction



Intraoperative photograph of excised aortic cusps from a patient with Marfan syndrome 10 years after reimplantation



## Causes for chronic failure after cusp repair

residual cusp prolapse

cusp retraction

unfavourable commissural orientation in a bicuspid aortic valve

failed recognition of a unicuspid morphology

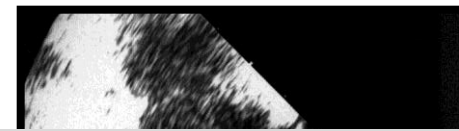
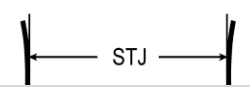
suture dehiscence after pericardial patch implantation

suture dehiscence after triangular resection

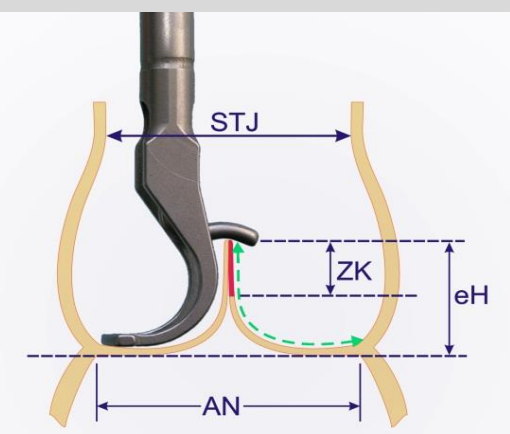
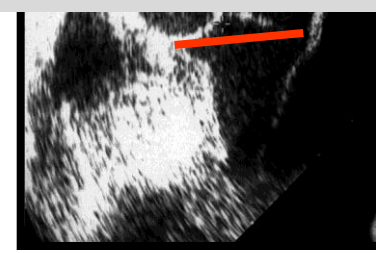
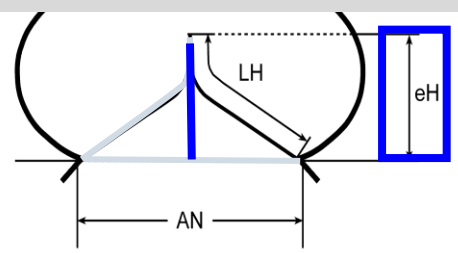
# Solutions

## A new approach to the assessment of aortic cusp geometry

Hans-Joachim Schäfers, MD, PhD, Benjamin Bierbach, MD, and Diana Aicher, MD, Homburg/Saar, Germany



### Effective height as indicator for cusp prolapse



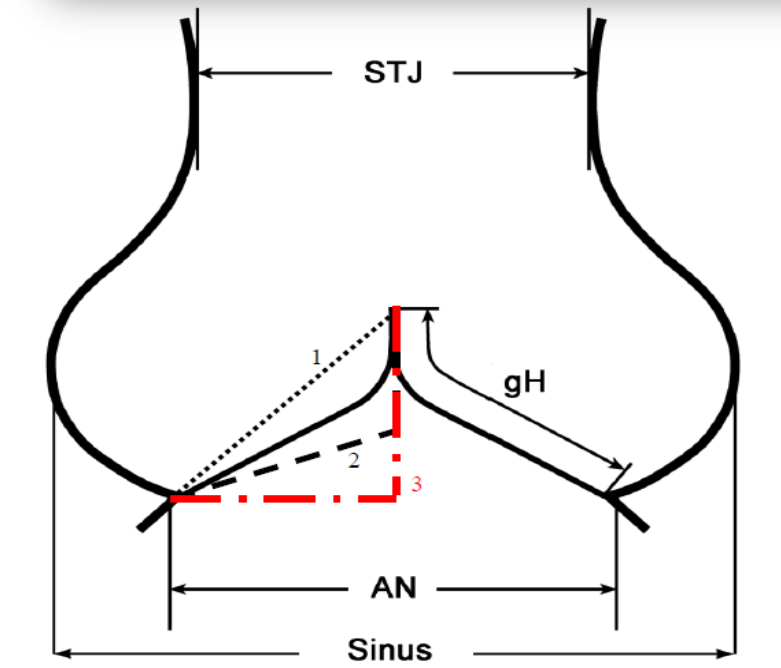
# Solutions

Schäfers et al

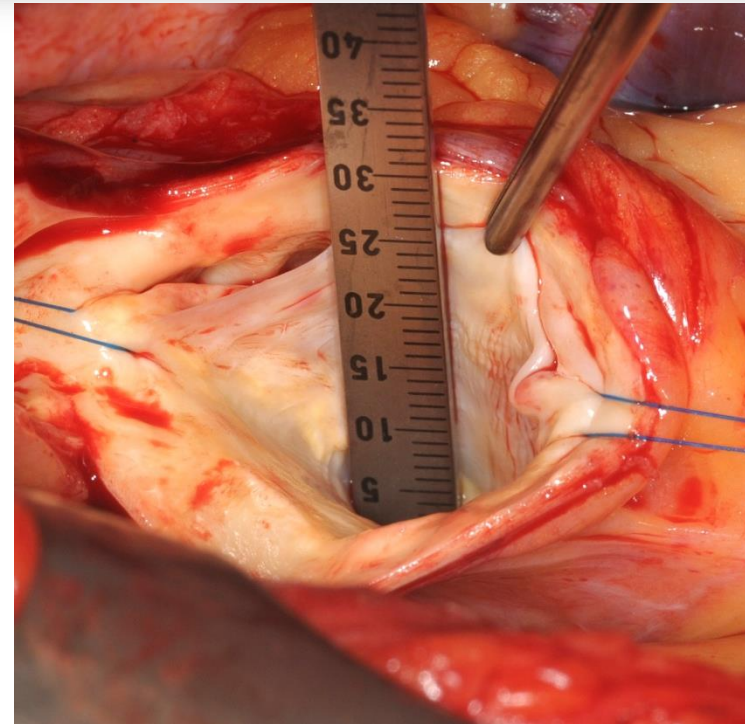
Acquired Cardiovascular Disease

## Cusp height in aortic valves

Hans-Joachim Schäfers, MD,<sup>a</sup> Wolfram Schmied, Dipl Psych,<sup>a</sup> Gil Marom, MSc,<sup>b</sup> and Diana Aicher, MD<sup>a</sup>



Geometrical height (gH)



# Solutions

Schäfers et al

Acquired Cardiovascular Disease

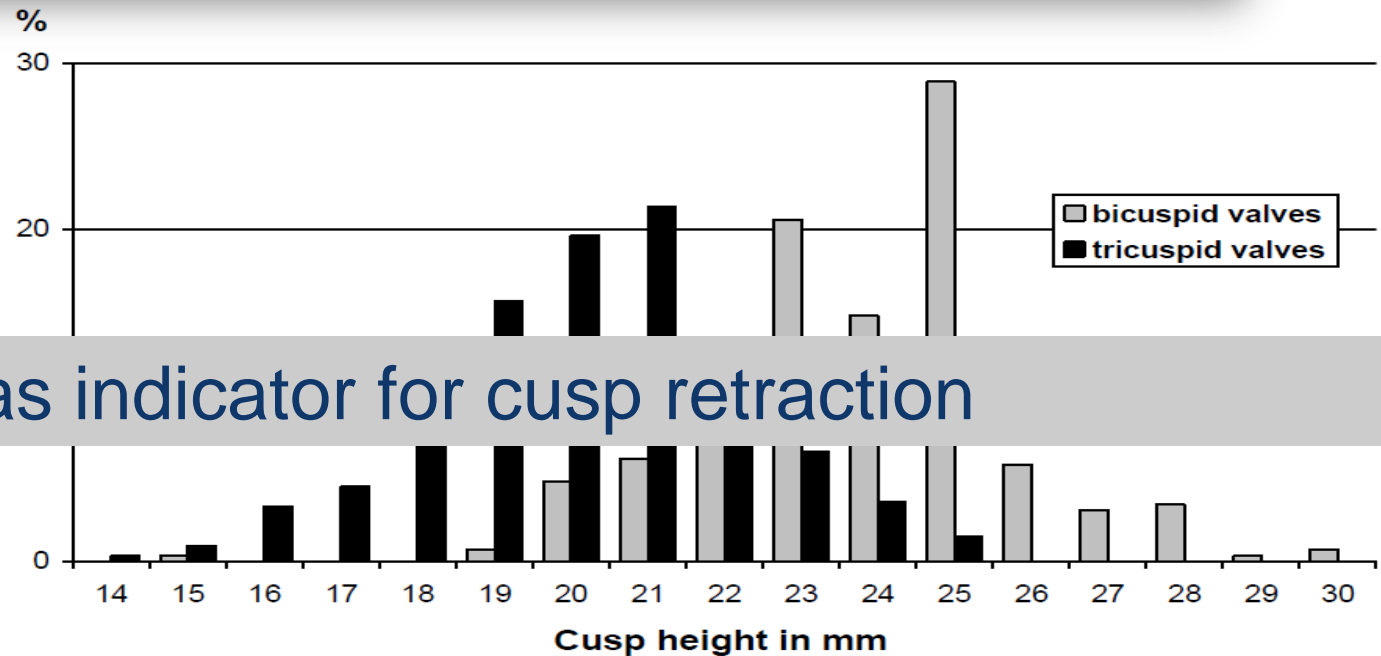
## Cusp height in aortic valves

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Mean geometrical height:

Bicuspid  $24 \pm 2\text{mm}$

Tricuspid  $21 \pm 3\text{mm}$



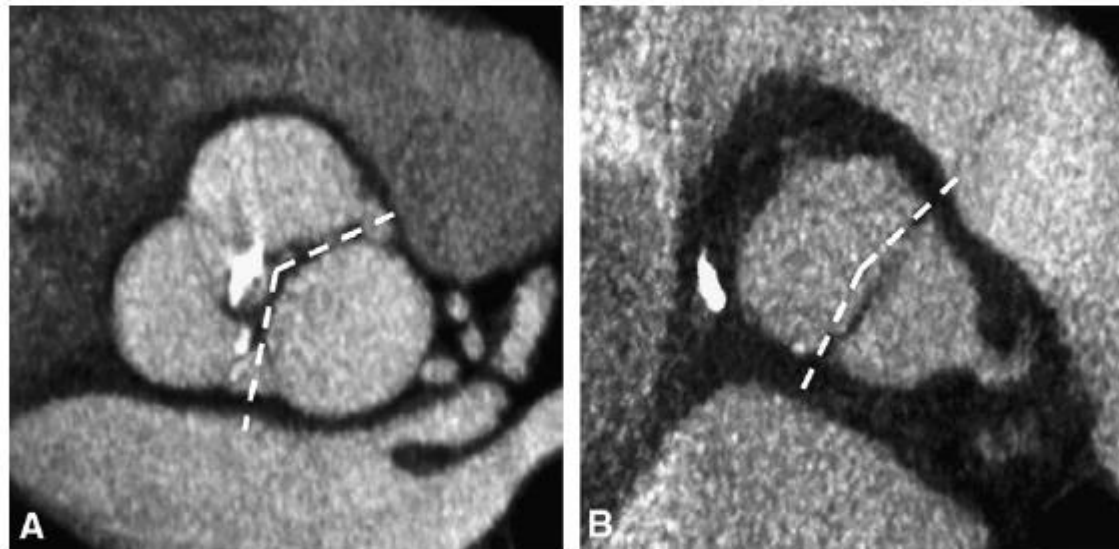
gH as indicator for cusp retraction

## Solutions

### Valve-preserving root replacement in bicuspid aortic valves

Hans-Joachim Schäfers, MD,<sup>a</sup> Takashi Kuniyama, MD, PhD,<sup>a</sup> Peter Fries, MD,<sup>b</sup> Brigitte Brittner, MD,<sup>a</sup> and Diana Aicher, MD<sup>a</sup>

#### Commissural orientation before and after root remodeling



**FIGURE 1.** Computed tomography of an aortic root with BAV preoperatively (A) and postoperatively (B). The commissural orientation of the commissures of the nonfused cusps (*dotted lines*).

## Management of failures

→ replacement or re-repair ?

- Retraction/stenosis → replacement
- residual prolapse → additional shortening (plication)
- suture dehiscence after pericardial patch implantation → individualized decision (invasiveness of plan B)



Re-repair, if mechanism of failure can predictably be eliminated

## Conclusions

With the use of eH as indicator for cusp prolapse and gH as indicator for cusp retraction, the most common reasons for failures after aortic valve repair can be avoided.

Reoperation after failure is possible with a low hospital mortality.

Identification of mechanism of failure allow re-repair in some patients.

# Insufficient commissural height

45 year old female with recurrent regurgitation after reimplantation of a BAV 6 months ago

Intraop findings:

- BAV: Fusion of right and noncoronary cusp
- Prolapse of both cusps
- limited perforation of the left cusp
- insufficient commissural height
- AV diameter 25mm

