

TCT Asia-Pacific, Seoul, South Korea

Tips & Tricks - CoreValve Implantation

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Transcatheter aortic valve implantation (TAVI)

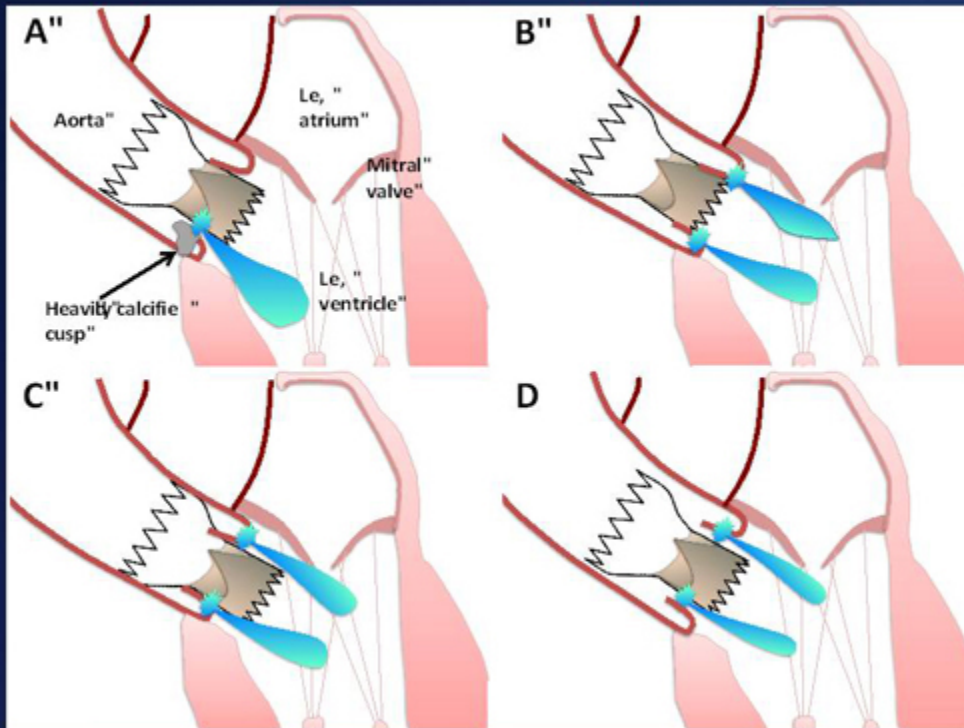


Annulus sizing
Evaluating periAR

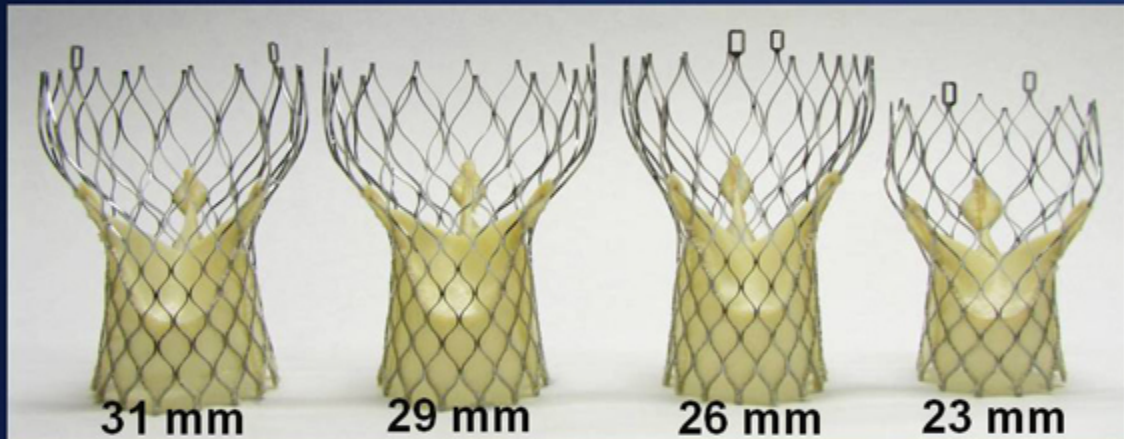
Valvuloplasty

Implantation depth

Mechanisms of Peri-prosthetic AR



Core Valve: Individualisation by different sizes



Annulus-Diameter 29 to 18mm

Annulus sizing

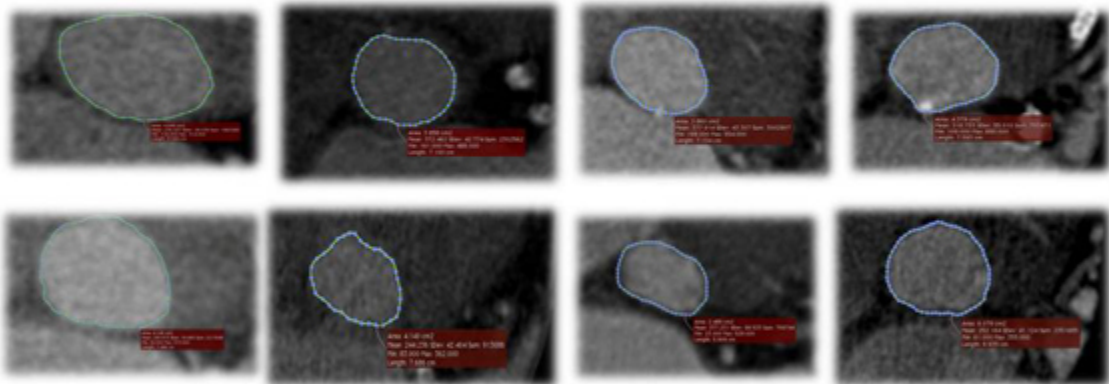
1. **Angiography**
2. **Echocardiography (TTE/TEE)**
3. **Multi-slice computed tomography**

for the evaluation of

- Annulus of the native aortic valve
- Aortic root
- Aorta ascendens
- Thoracic and abdominal aorta
- Aortoiliac and subclavian vessels

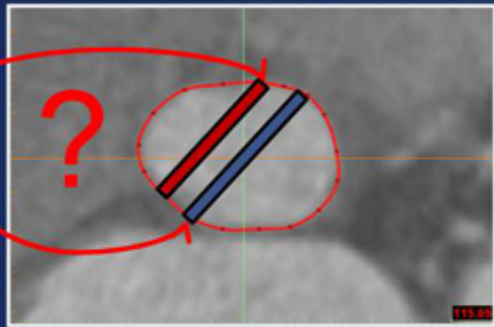
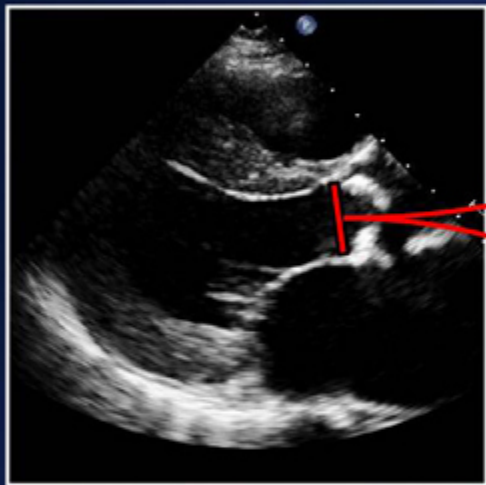
The Aortic Annulus

The aortic annulus is typically non-circular



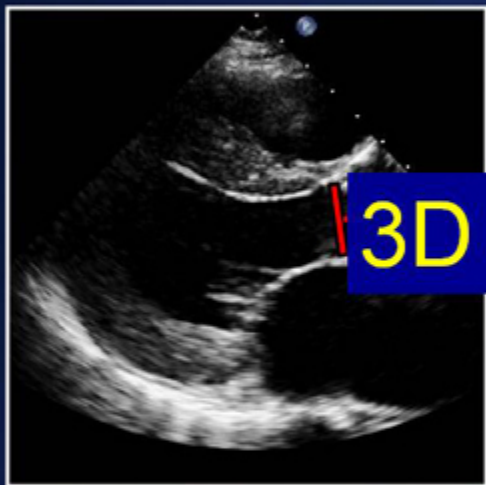
Double-oblique axial images at the aortic annular plane
Courtesy of Dr. Piazza and Prof. Lange, German Heart
Center, Munich Germany

A Limitation of Echo

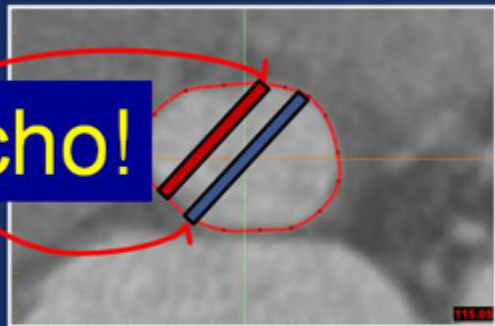


It is possible a true diameter is not measured due to the imaging plane acquired

A Limitation of Echo



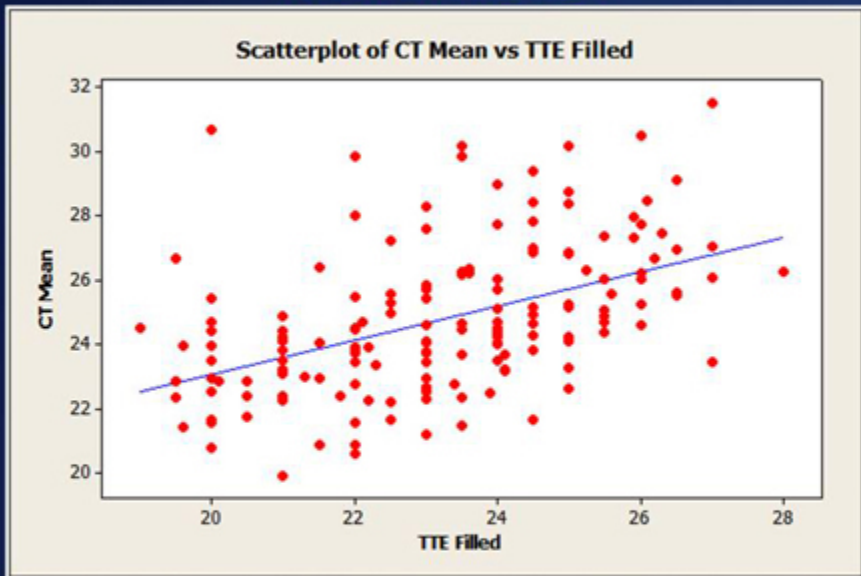
3D Echo!



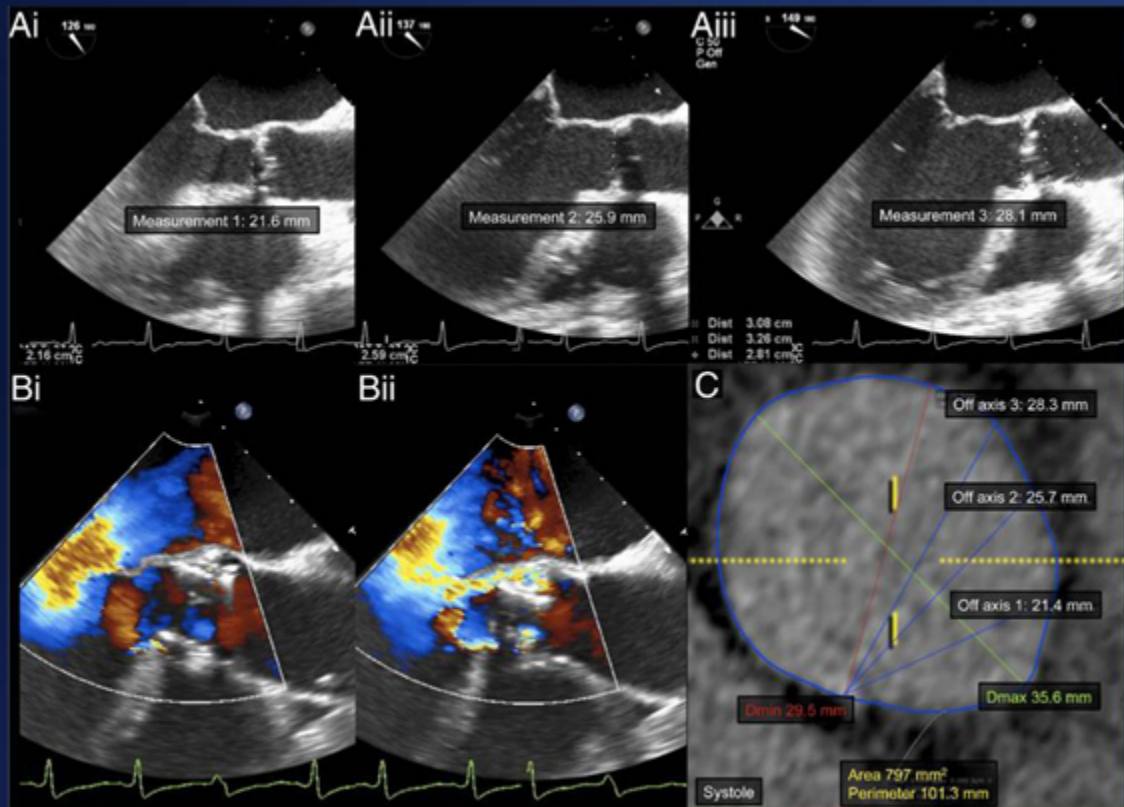
It is possible a true diameter is not measured due to the imaging plane acquired

Low Correlation Between Echo and CT

MEAN DIAMETER



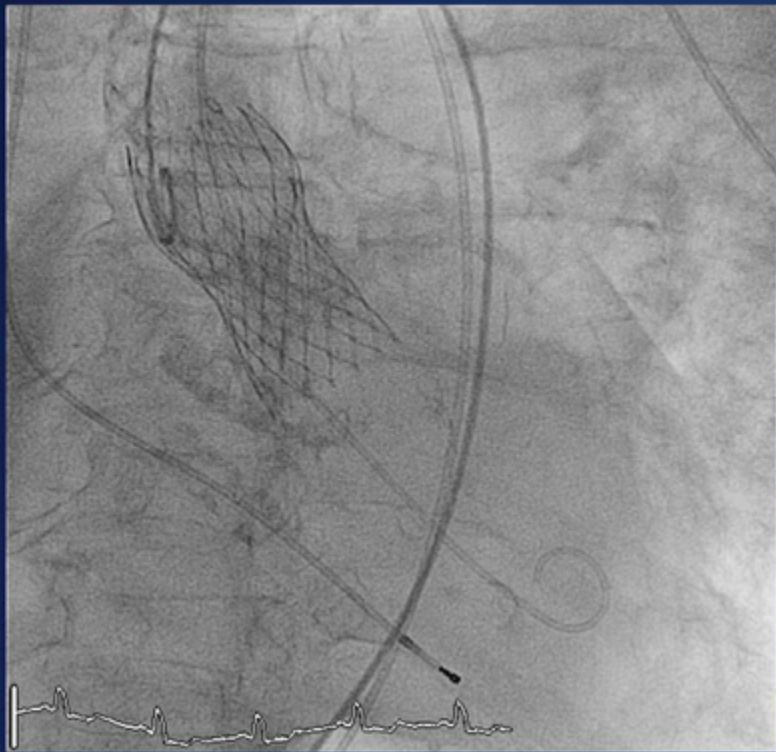
162 patients → Low correlation between echo diameter and all CT derived measurements (major, minor, & mean diameters, perimeter, and area)
Courtesy of Dr. Piazza and Prof. Lange, German Heart Center, Munich Germany



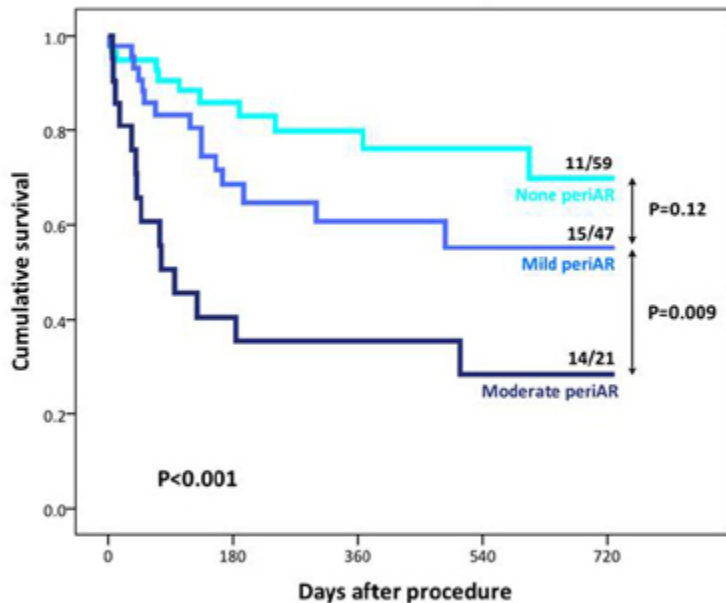
CoreValve Sizing

Prosthesis	Annulus	Perimeter	%oversizing
31	29mm	91.1	6.45%
31	28mm	88	10.30%
31	27mm	84.8	12.90%
31	26mm	81.7	16.13%
31	25mm	78.5	19.35%
29	27mm	84.8	6.90%
29	26mm	81.7	10.30%
29	25mm	78.5	13.80%
29	24mm	75.4	17.24%
29	23mm	72.3	20.68%
29	22mm	69.1	24.14%
26	23mm	72.3	11.50%
26	22mm	69.1	15.40%
26	21mm	66	19.20%

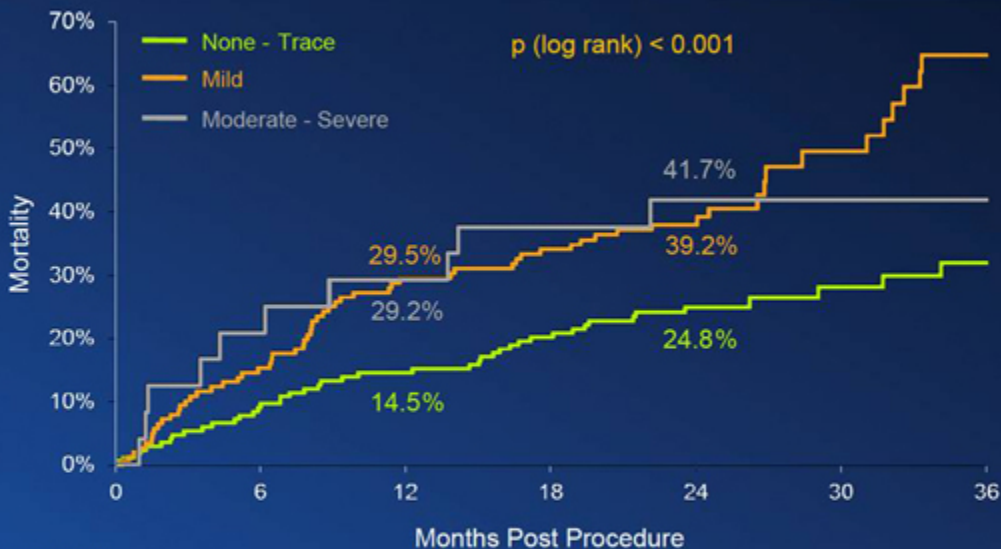
Assessing peri AR



2-year Outcome according to the Grade of Periprosthetic AR



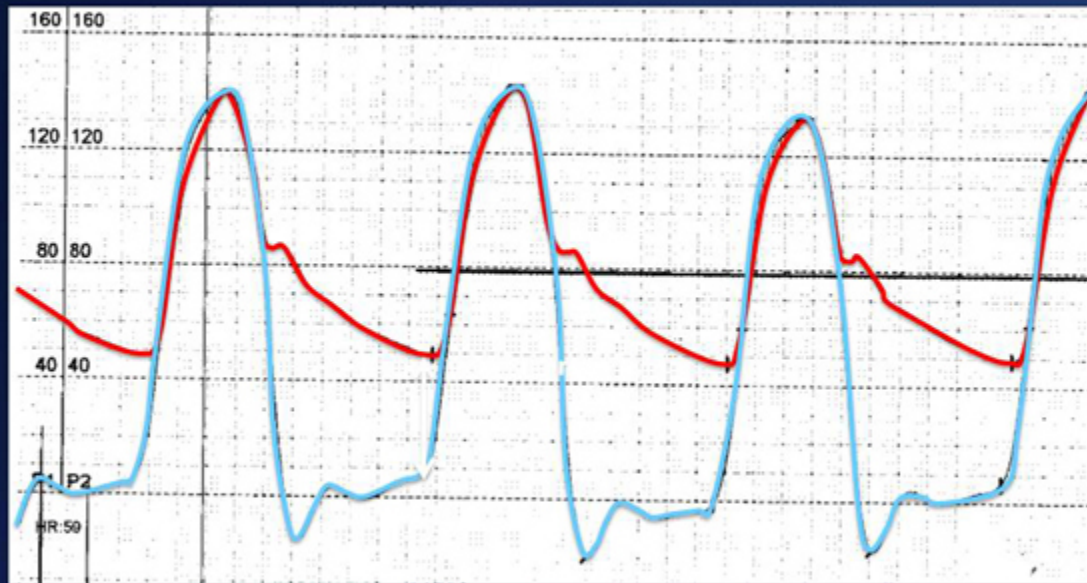
Influence of periAR on outcome



Numbers at Risk

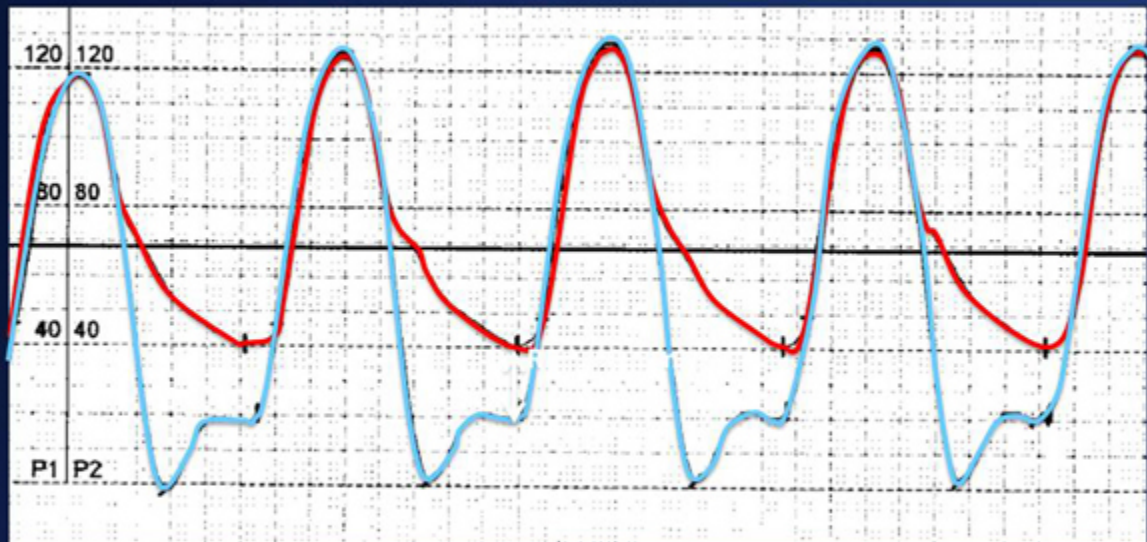
	0	6	12	18	24	30	36
None-Tr	167	149	140	126	87	41	16
Mild	136	115	95	86	51	21	10
Mod-Sev	24	19	17	15	13	5	2

Aortic Regurgitation Index: Mild AR



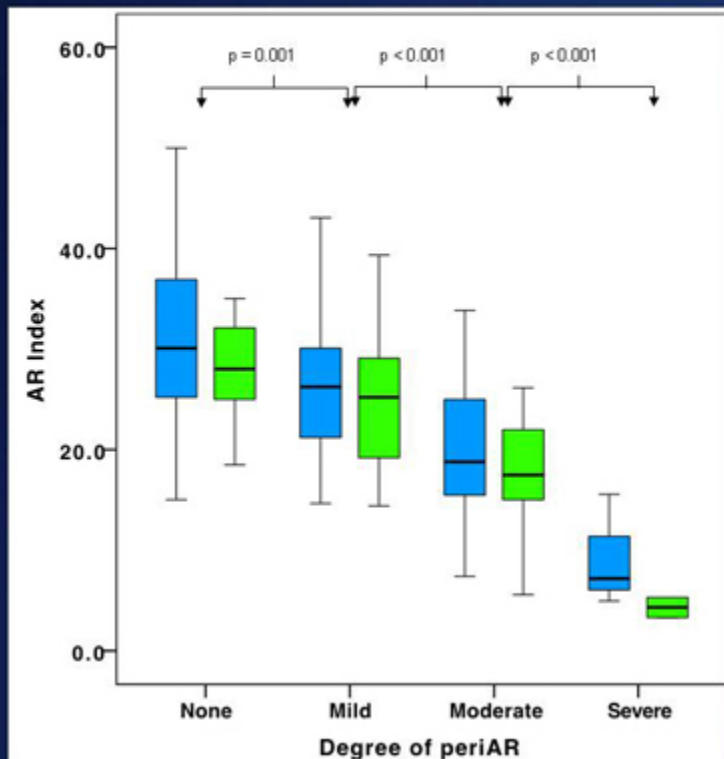
Aortic regurgitation Index = $[(RR_{\text{dia}} - \text{LVEDP}) / RR_{\text{sys}}] \times 100$
= $[(60 - 15) / 150] \times 100 = \underline{\underline{30.0}}$

Aortic Regurgitation Index: Moderate AR



$$\begin{aligned}\text{Aortic regurgitation Index} &= [(RR_{\text{dia}} - \text{LVEDP}) / RR_{\text{sys}}] \times 100 \\ &= [(40 - 20) / 120] \times 100 = \underline{\underline{16.7}}\end{aligned}$$

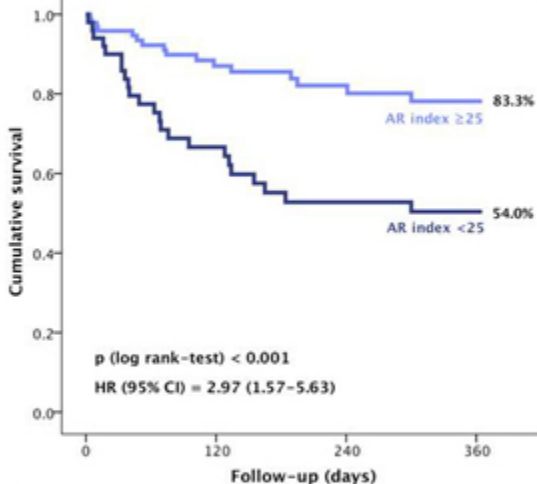
AR index according to the degree of peri-prosthetic aortic regurgitation



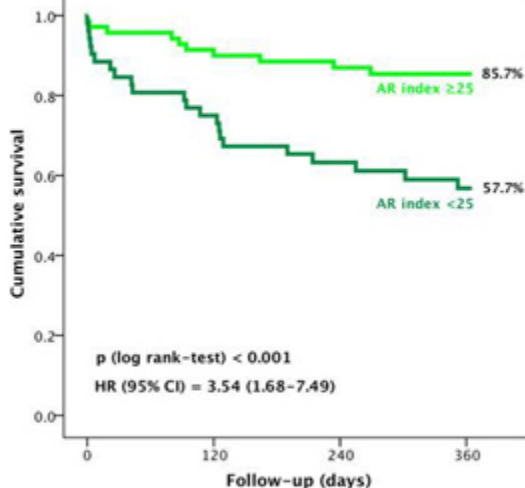
Bonn (N=146)

Leicester (N=122)

1-y mortality according to AR index

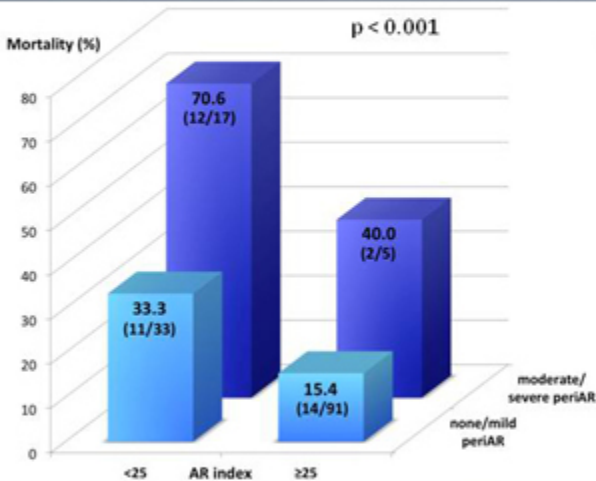


No. at risk			
Survivors			
AR index ≥ 25	96	92	66
AR index < 25	50	44	26
Non-survivors			
AR index ≥ 25	0	4	14
AR index < 25	0	6	21
Total	146	146	127

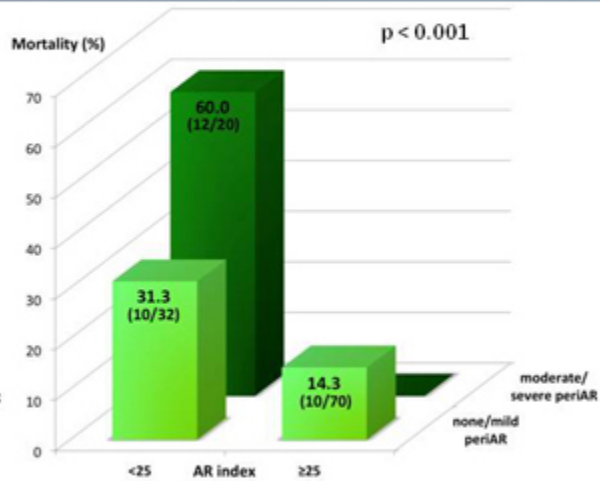


No. at risk			
Survivors			
AR index ≥ 25	70	67	60
AR index < 25	52	44	35
Non-survivors			
AR index ≥ 25	0	3	8
AR index < 25	0	8	17
Total	122	122	120

1-year mortality stratified according to severity of periAR and AR index



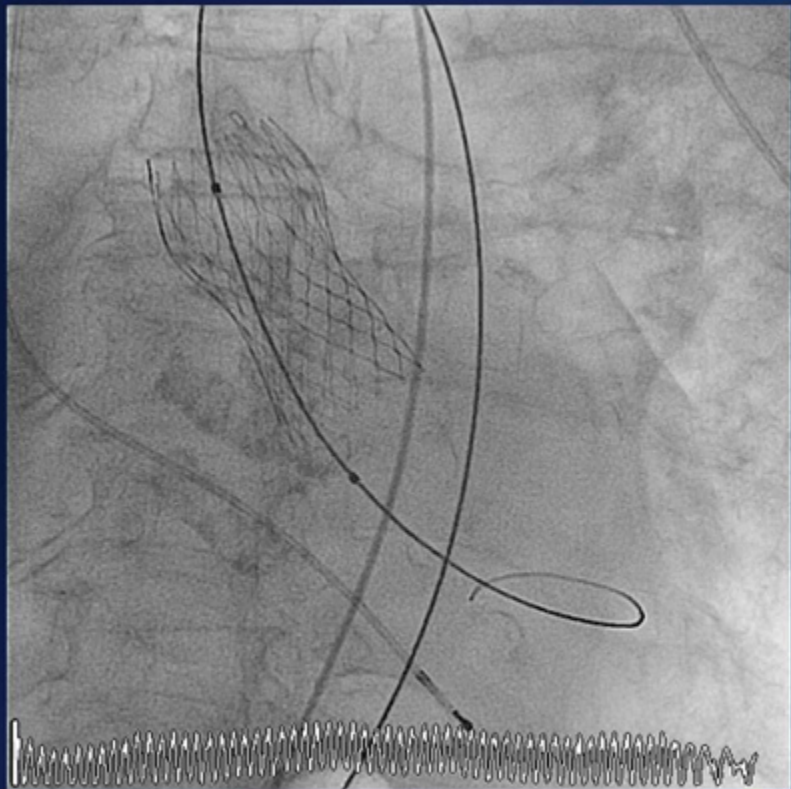
Bonn (N=146)

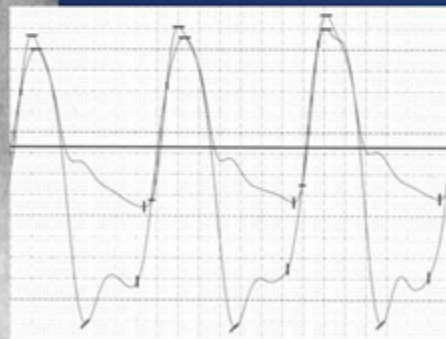
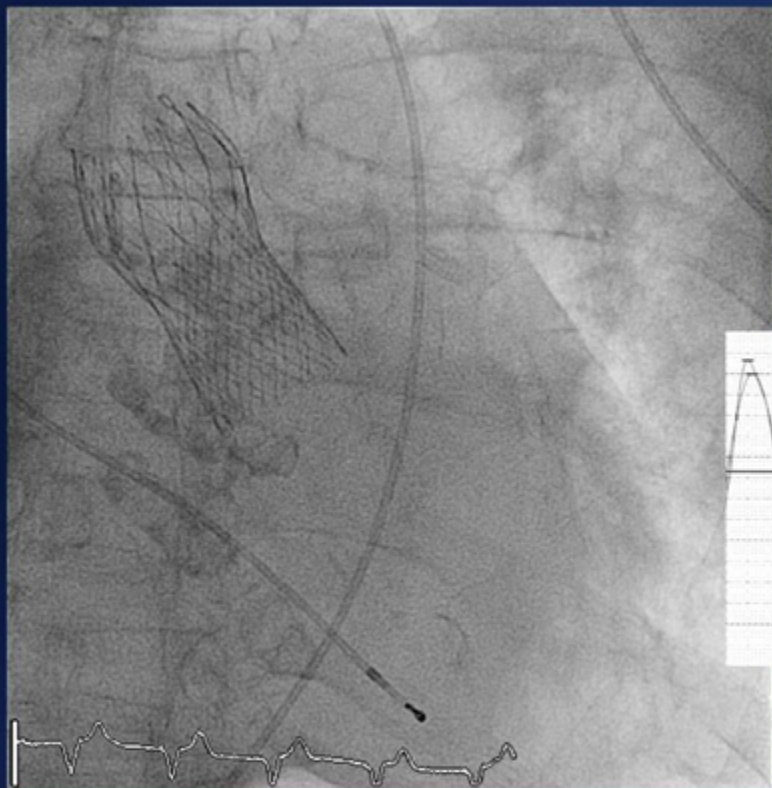


Leicester (N=122)



AR index = 23.3

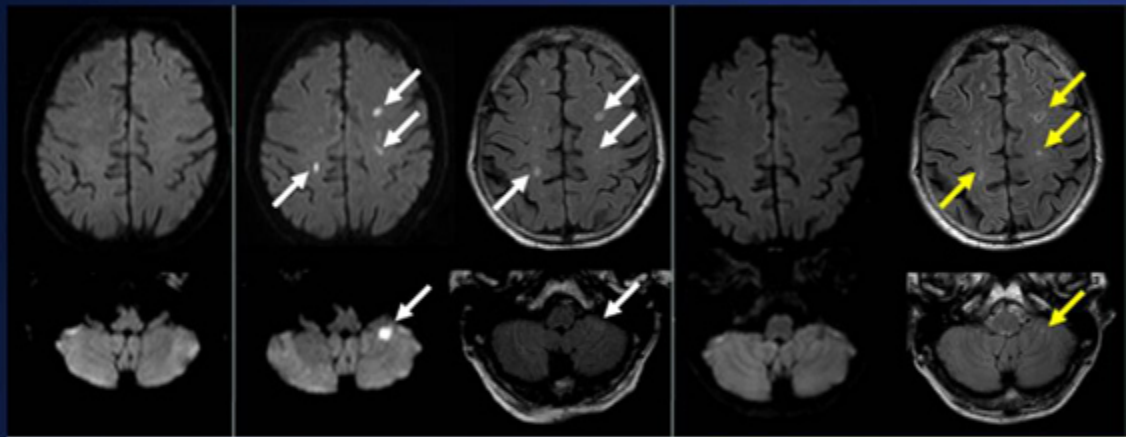




AR index = 32.0

Cerebral Embolism after TAVI

73% of TAVI patients had new cerebral lesions after TAVI



A DW-MRI in a 73-year-old man demonstrates multiple, bilateral embolism of the cerebrum and cerebellum (arrows). Selected emboli demonstrate signal intensity in the fluid-attenuated inversion recovery sequence as sign of neuronal repair (yellow arrows). The patient had no clinically apparent focal neurological deficits after TAVI (NIHSS: 0).

Transcranial Doppler examination of both middle cerebral arteries (MCA) to identify microembolic signals during seven phases of the transapical procedure

Microembolic Signals

Valvuloplasty

right MCA: 3 ± 5.6 (range 0-31);

left MCA: 2 ± 4.9 (range 0-30)]

Positioning of the prosthetic valve

right MCA: 6 ± 5 (range 0-22);

left MCA: 2 ± 6.9 (range 0-38)]

Clinical relevance of microembolic events unknown!



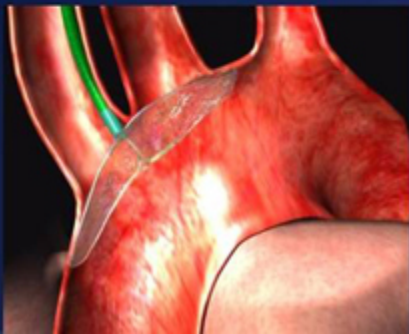
Cerebral Embolic Protection Device



Embrella Embolic
Deflector Device



Claret Dual Filter Device



Feasibility of Transcatheter Aortic Valve Implantation Without Balloon Pre-Dilation: A Pilot Study

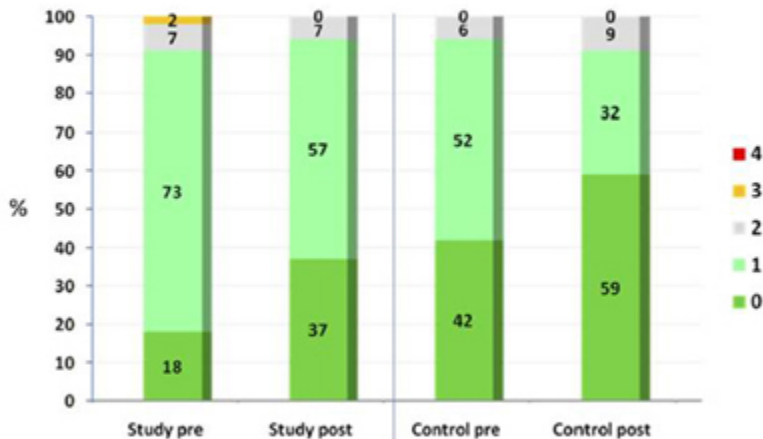
Eberhard Grube, Christoph Naber, Alexandre Abizaid, Eduardo Sousa, Oscar Mendiz, Pedro Lemos, Roberto Kalil Filho, Jose Mangione, and Lutz Buellesfeld
J. Am. Coll. Cardiol. Interv. 2011;4;751-757
doi:10.1016/j.jcin.2011.03.015

Table 3. Clinical Short-Term Outcome

	Study Group (n = 60)	Control Group (n = 126)
All-cause mortality	6.7% (4)	14.3% (18)
Myocardial infarction	0	5.6% (7)
Stroke/TIA	5.0% (3)	11.9% (15)
Need for pacemaker implantation	11.7% (7)	27.8% (35)
Vascular access complication	10.0% (6)	9.5% (12)

Values are % (n).
TIA = transient ischemic attack.

Aortic regurgitation

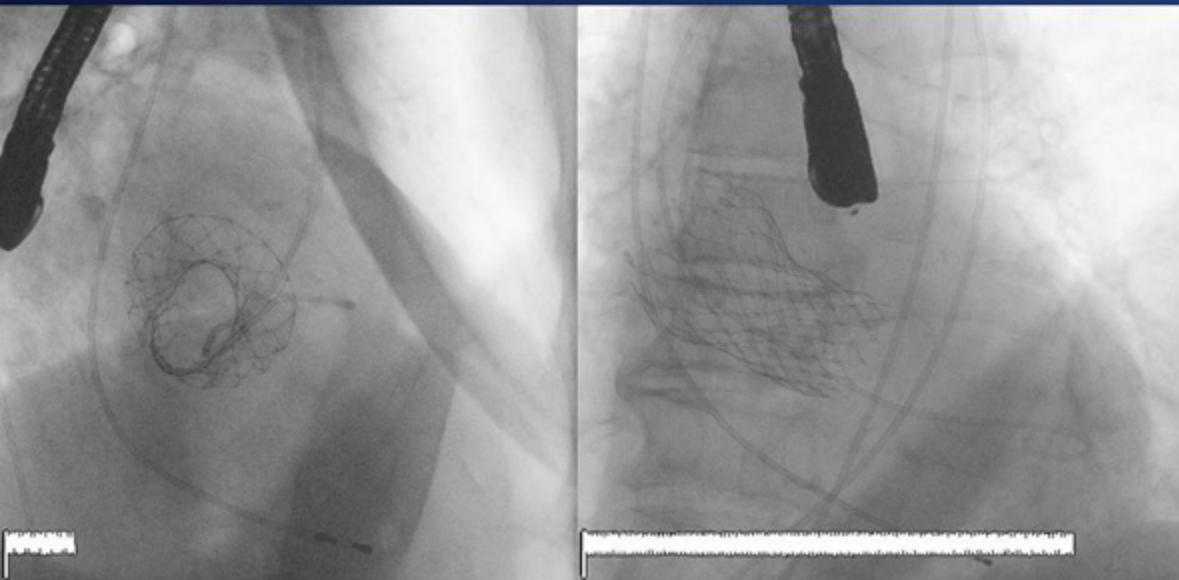


Procedural results

	Study Group (n = 60)	Control Group (n = 126)
Technical success rate	96.7% (58)	81.7% (103)
Valve embolization	0	0
Conversion to surgery	1.7% (1)	5.6% (7)
Post-dilation	16.7% (10)	NA

Values are % (n).
NA = not available.

Lady with an exceptional anatomy...

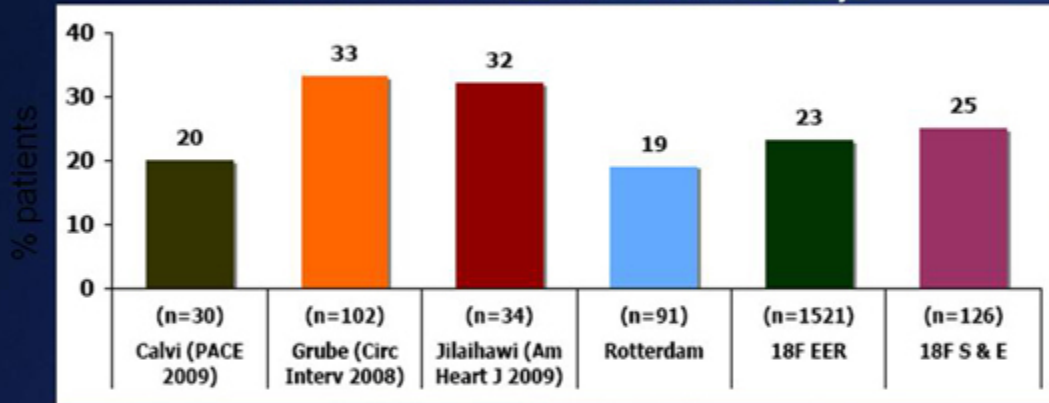


Patient with (!) predilatation

Incidence of Pacemaker Implant

Medtronic CoreValve

New Permanent Pacemaker within 30 Days¹



Weighted average = 23%
(n=1990 patients)

- Need for PPM after surgical PAVR – 3.2-8.5% at 30 months²
- Need for PPM after Edwards Sapien valve implant - 4.5% at 1 year³

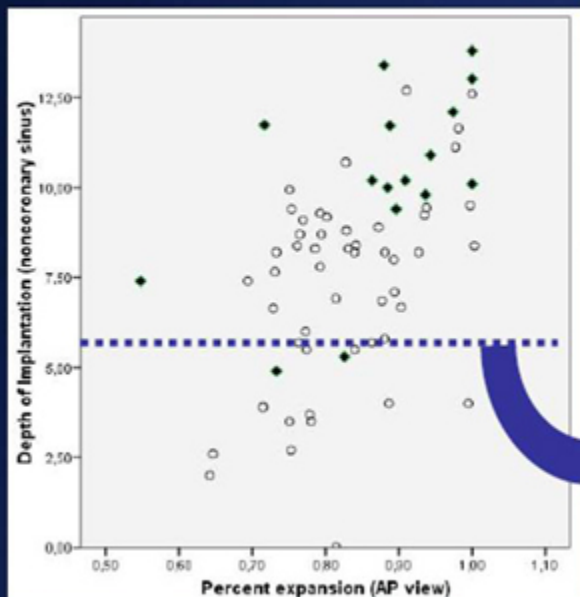
¹Grube, TCT Asia 2010

²Dawkins, S et al. Ann of Thoracic Surgery 2007

³Leon, M et al. NEJM 2010

Depth of Implantation

May Play a Role in Onset of Rhythm Disturbances¹



New-onset LBBB acquired during or after valve implantation

10.3 mm



No new-onset LBBB or new-onset LBBB acquired during procedure but before valve implantation

7.3 mm

6.0 mm below coronary sinus

Tips & Tricks - Conclusion

Annulus sizing is one of the most important steps in CoreValve implantation given the fact that we will have 4 valve sizes available

Careful assessment of periAR is mandatory to improve outcome of patients. The AR index allows the immediate, on-site evaluation of periAR.

BAV may be associated with less complications (stroke, pacemaker implantation rate, cardiac failure)

Always aim at a high implantation in order to decrease the risk for pacemaker implantation