Complex TAVR for Specific Challenging Cases (ViV)
- How to do in Practice -

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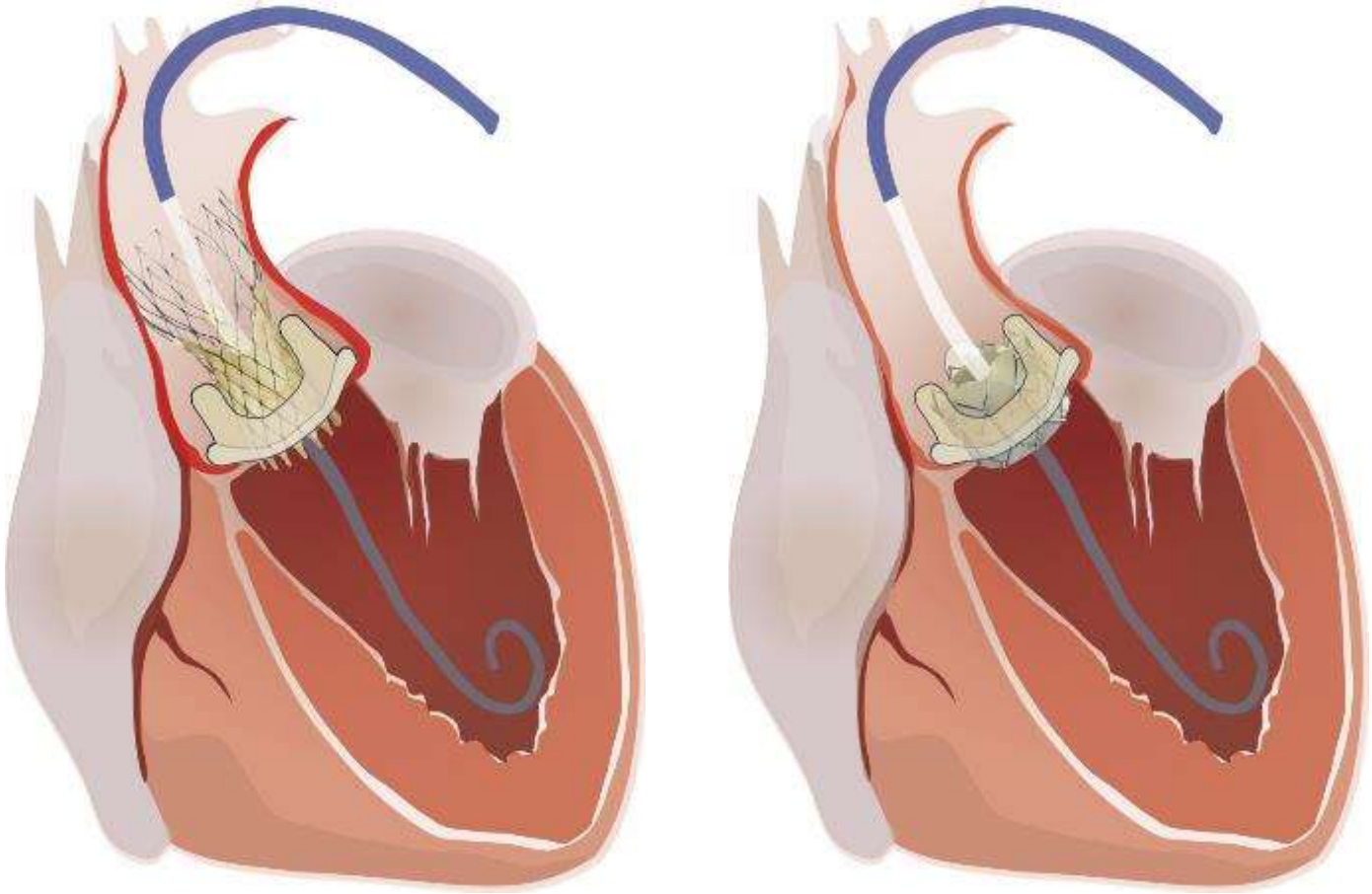
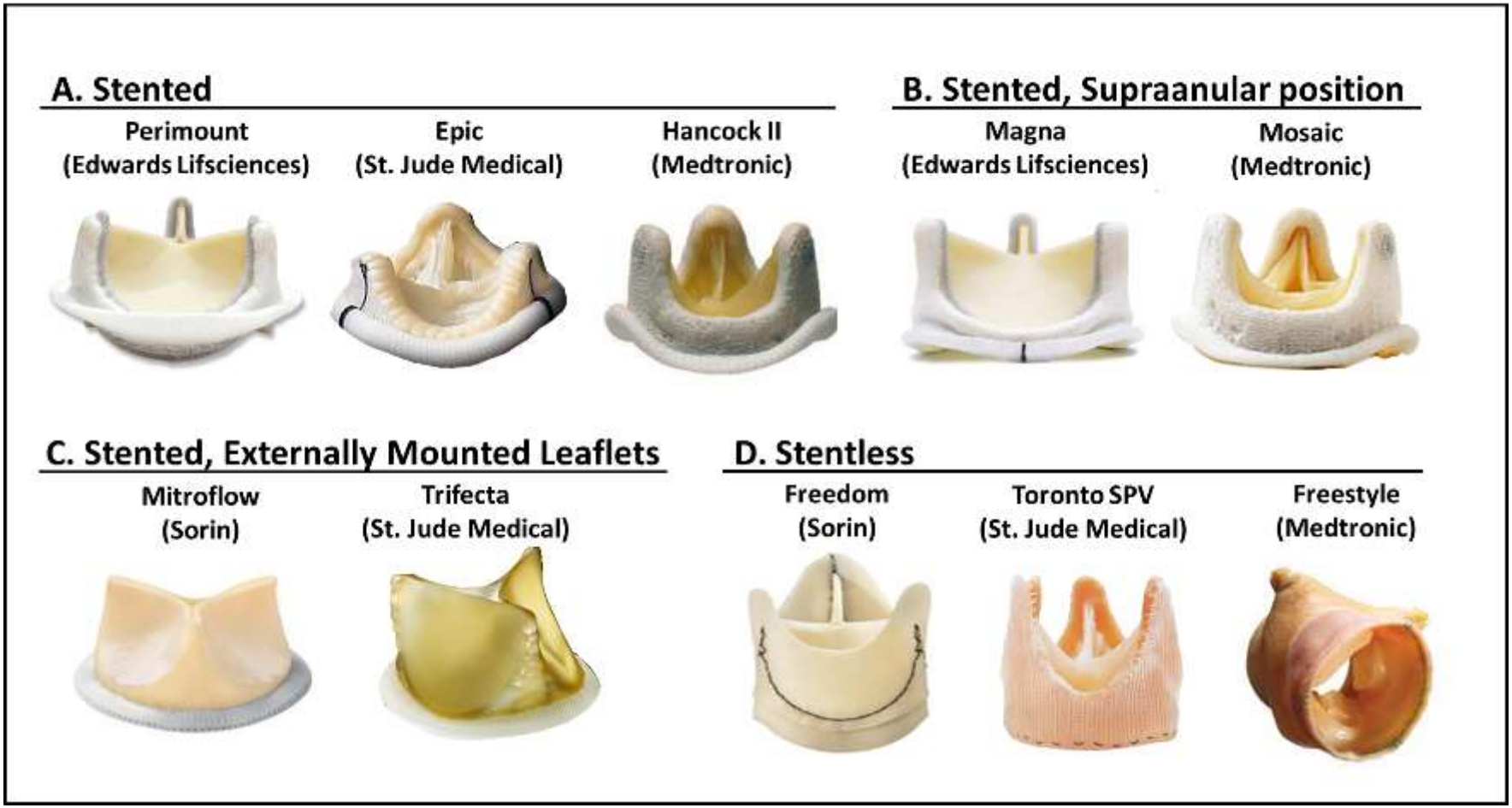
Valve-in-Valve:

a less invasive approach for failed bioprostheses



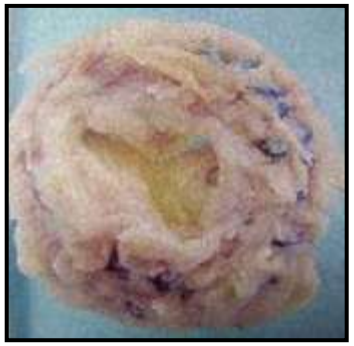
Bioprosthetic Valves



Mechanism of valve failure

AS

Pannus



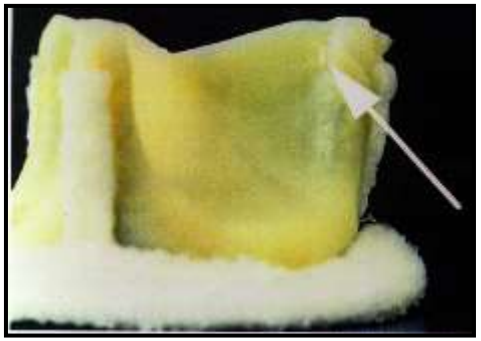
Thrombus

Calcification

AR

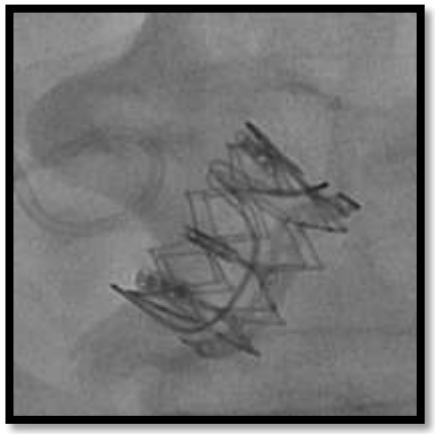
Wear & Tear (int.)

Wear & Tear (ext.)

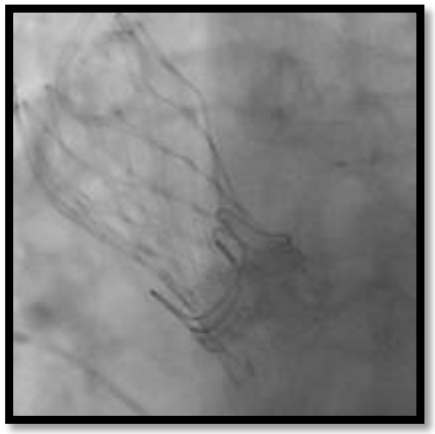


Endocarditis

Different THV devices

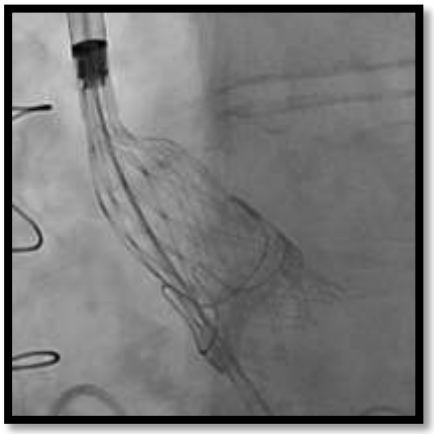


SAPIEN XT



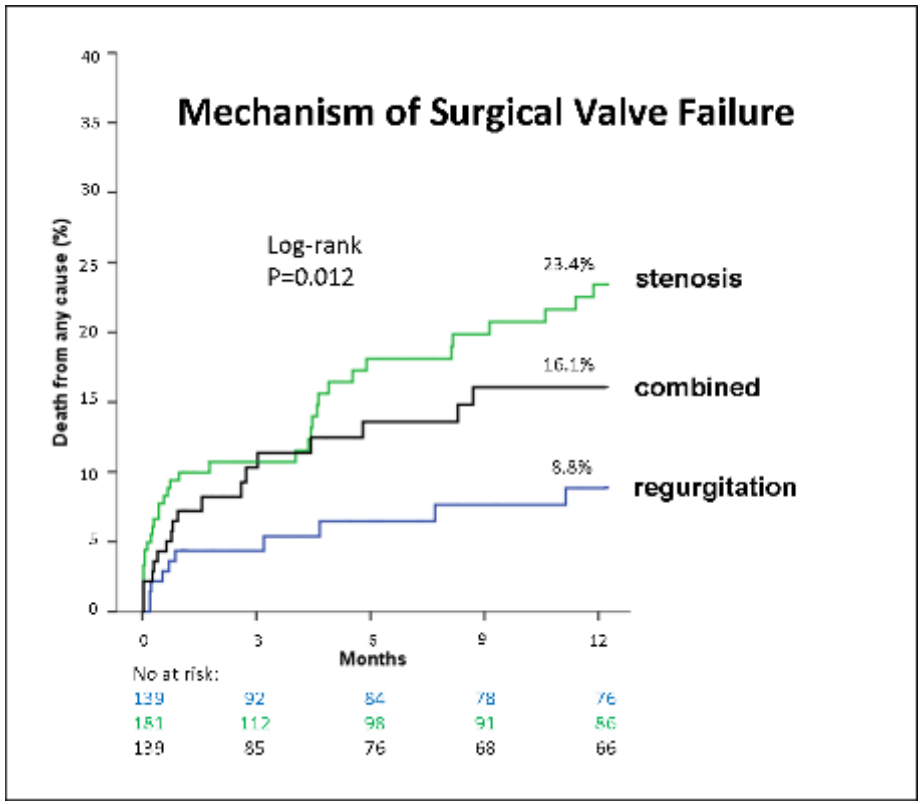
CoreValve

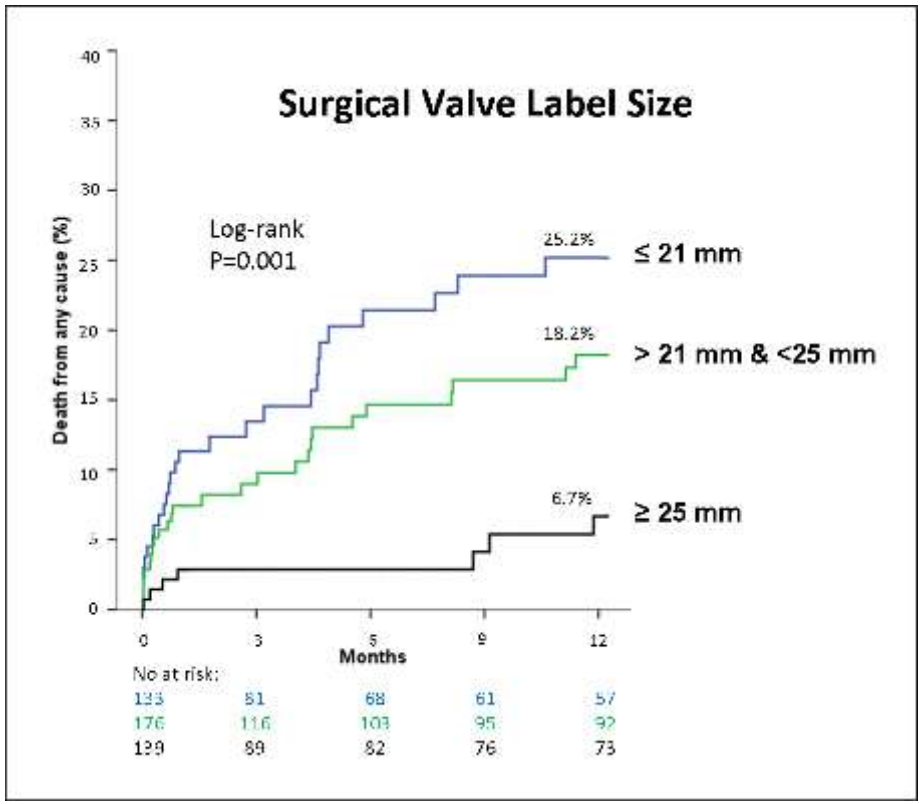
SAPIEN 3



Evolut R

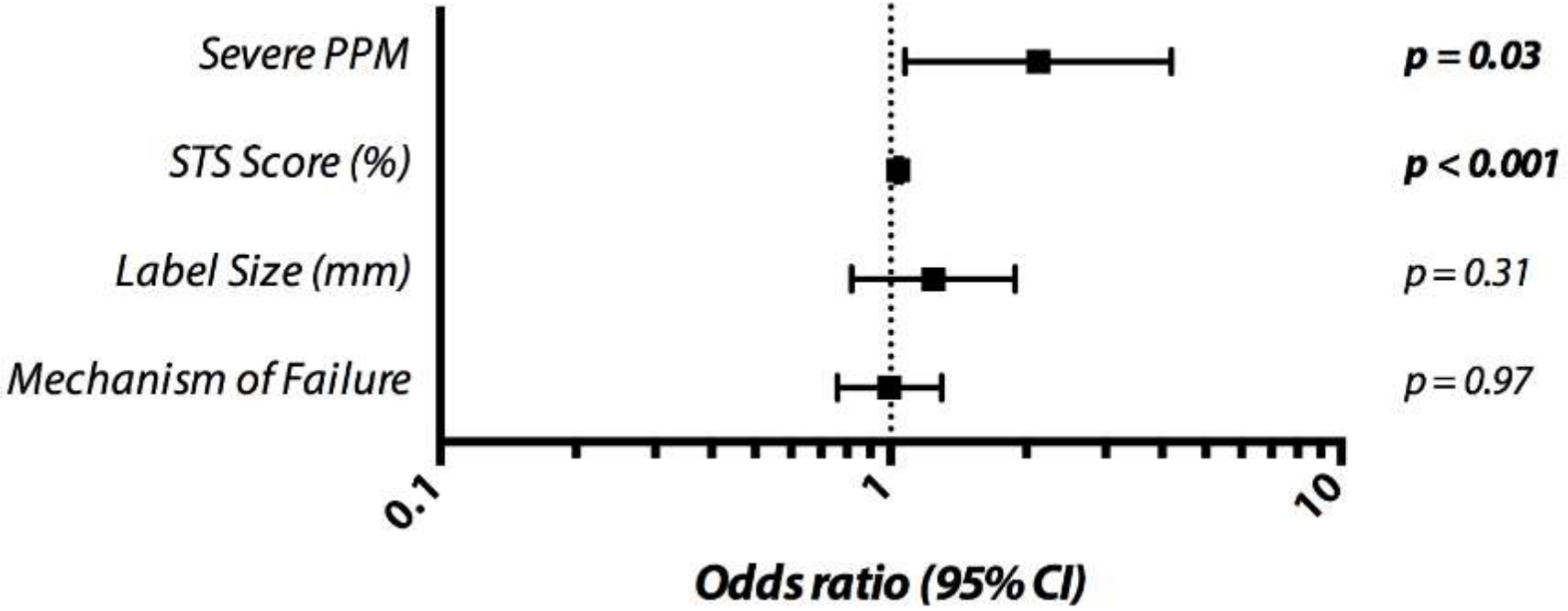
Mortality after aortic ViV



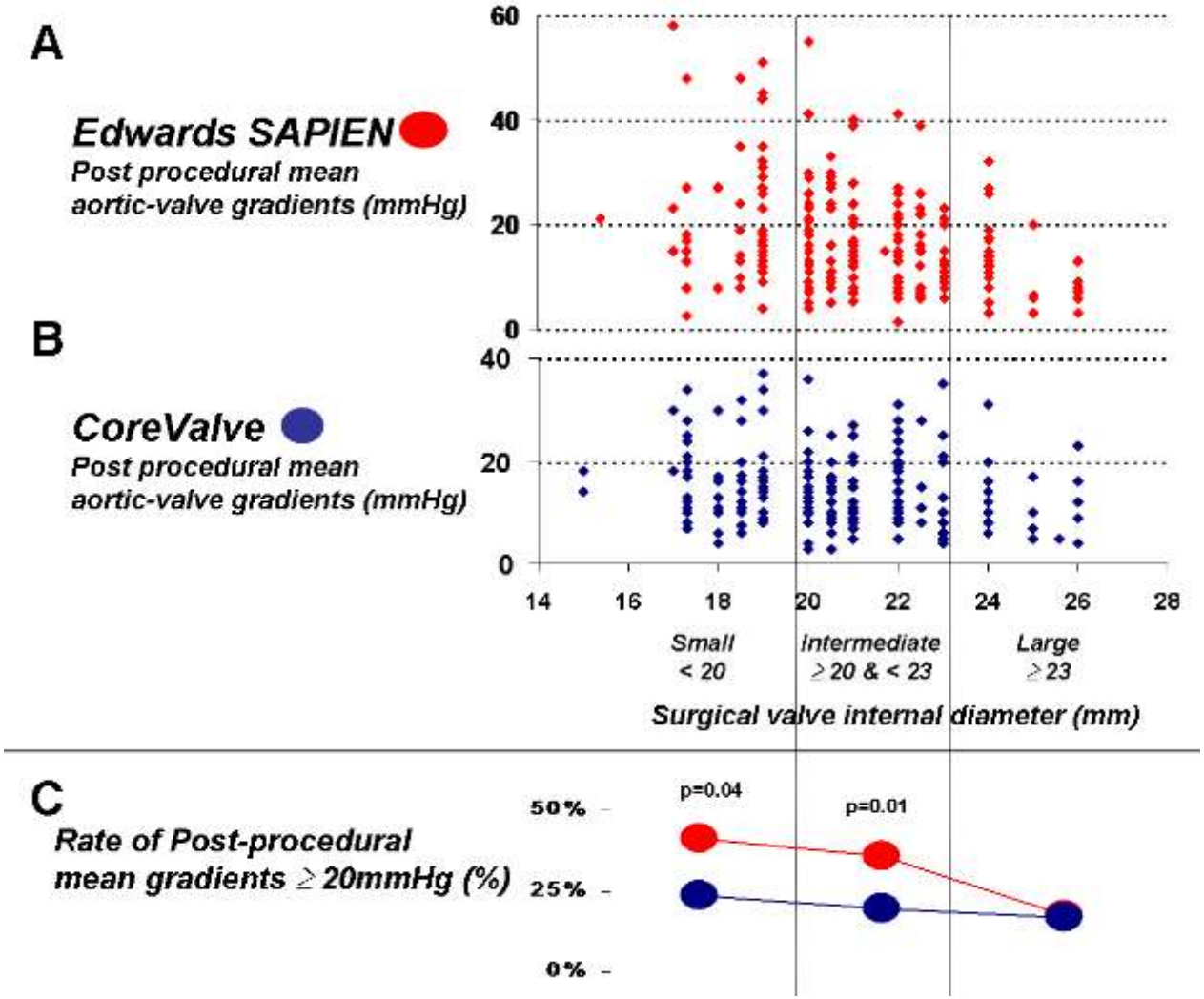


Dvir D et al. JAMA. 2014;312(2):162-170.

Correlates of Mortality after Aortic Valve-in-Valve

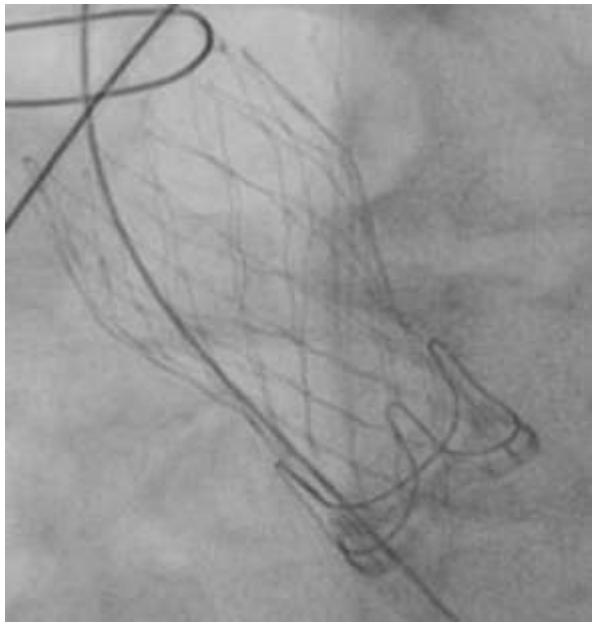


Residual Stenosis: the "Achilles' heel" of ViV procedures

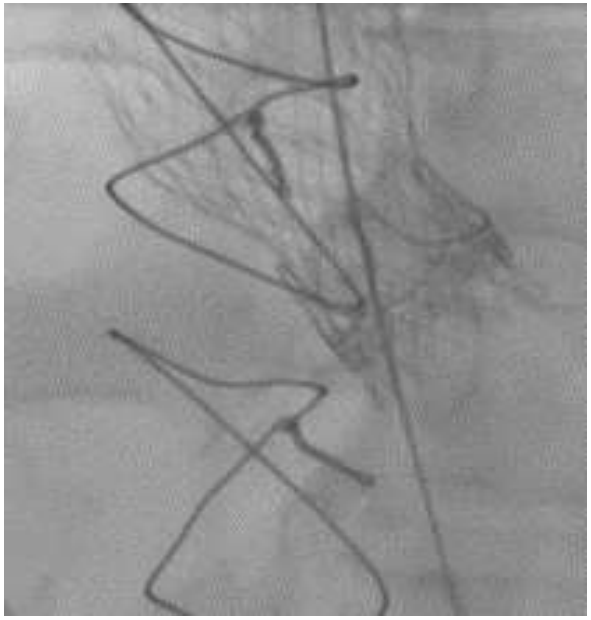


Dvir D et al. JAMA. 2014;312(2):162-170.

HIGH

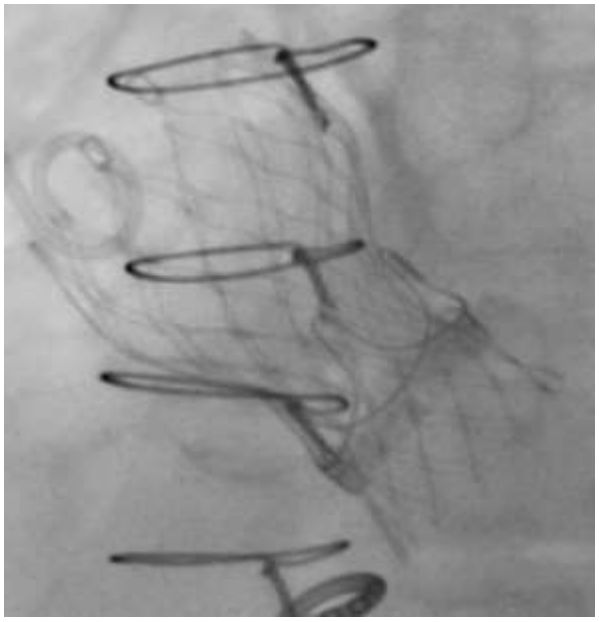


Perimount 21mm
CoreValve 23mm
Depth: 1.3mm
Post mean gradient:11mmHg



Perimount 21mm
CoreValve 23mm
Depth: 6.2mm
Post mean gradient: 25mmHg

LOW



Perimount 21mm
CoreValve 23mm
Depth: 9.8mm
Post mean gradient: 24mmHg

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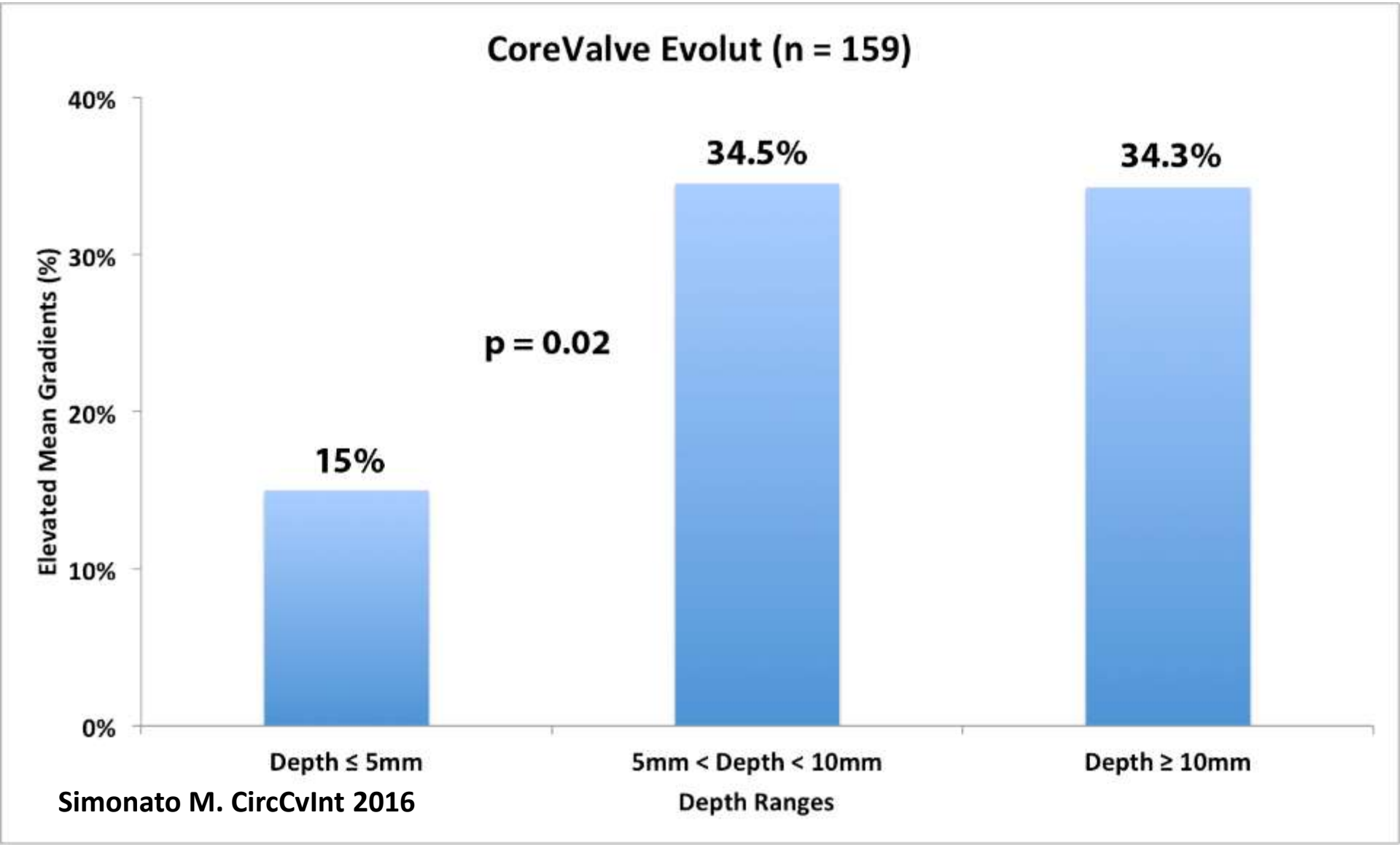
Implantation Depth and Gradients



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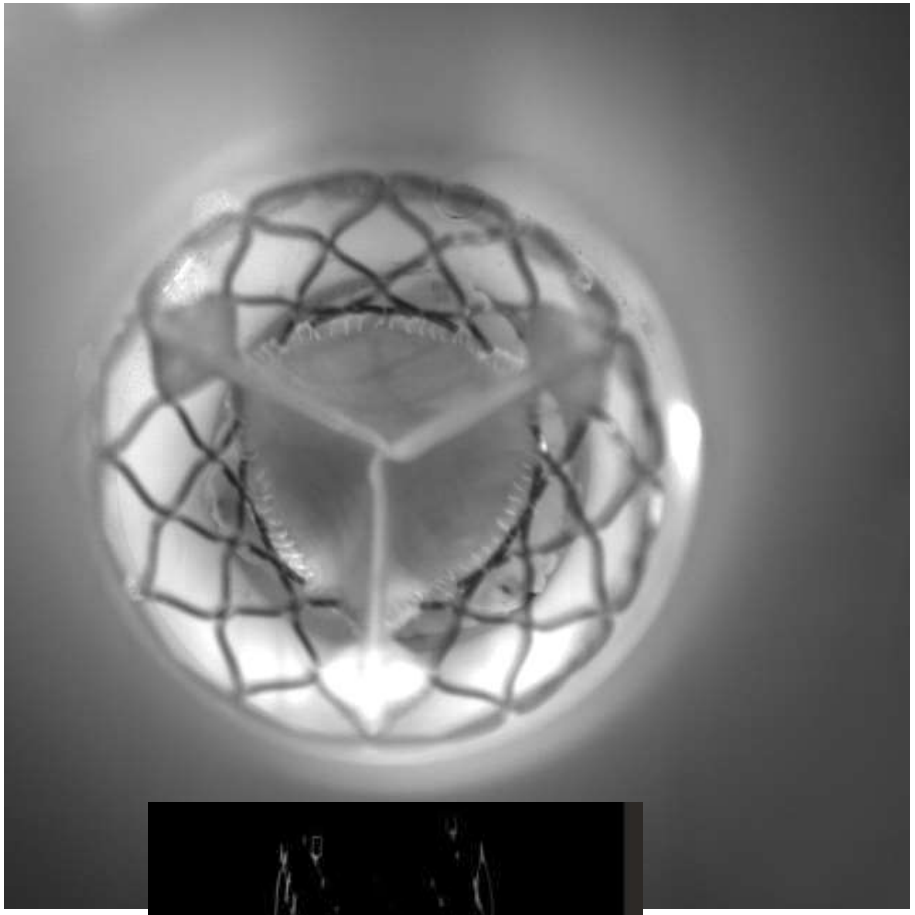

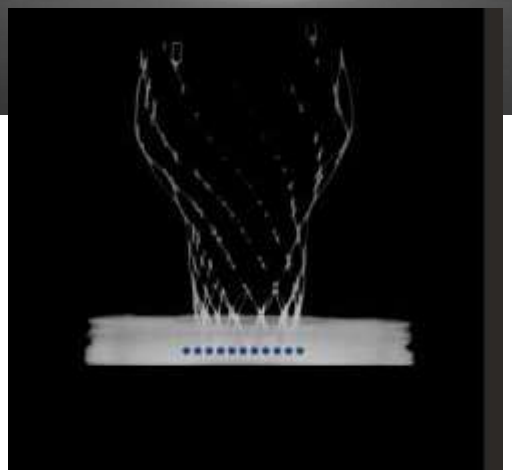

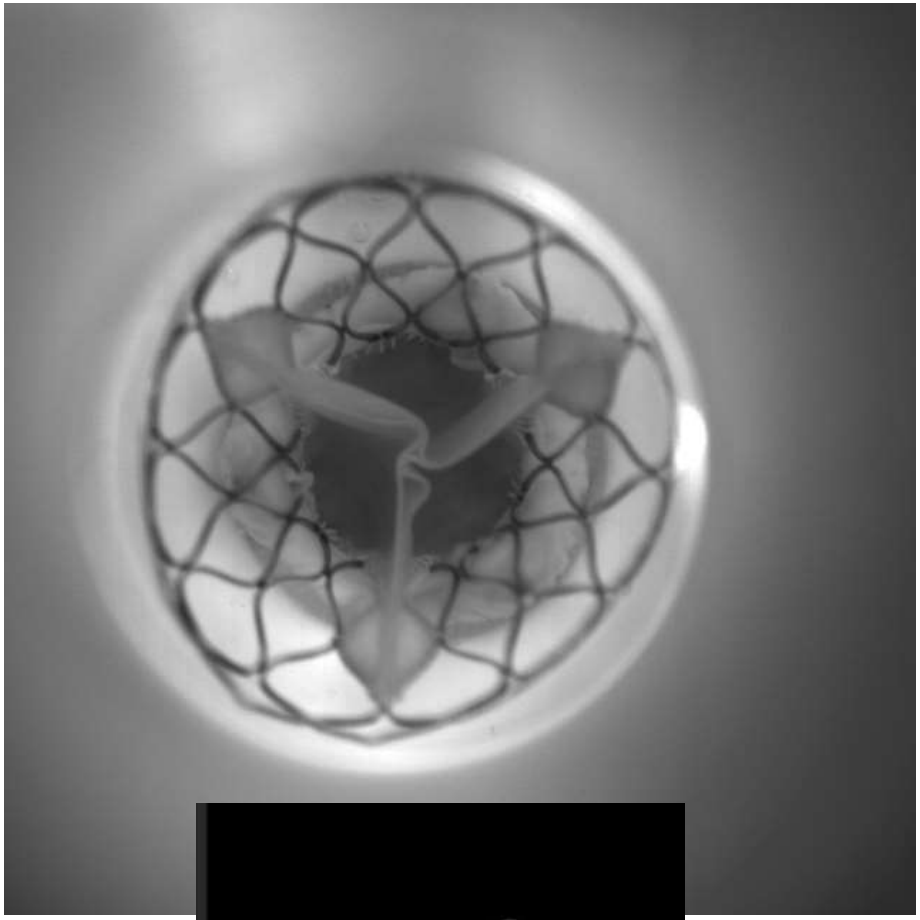

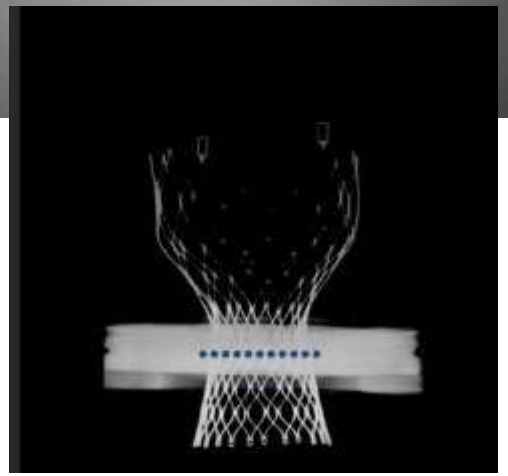

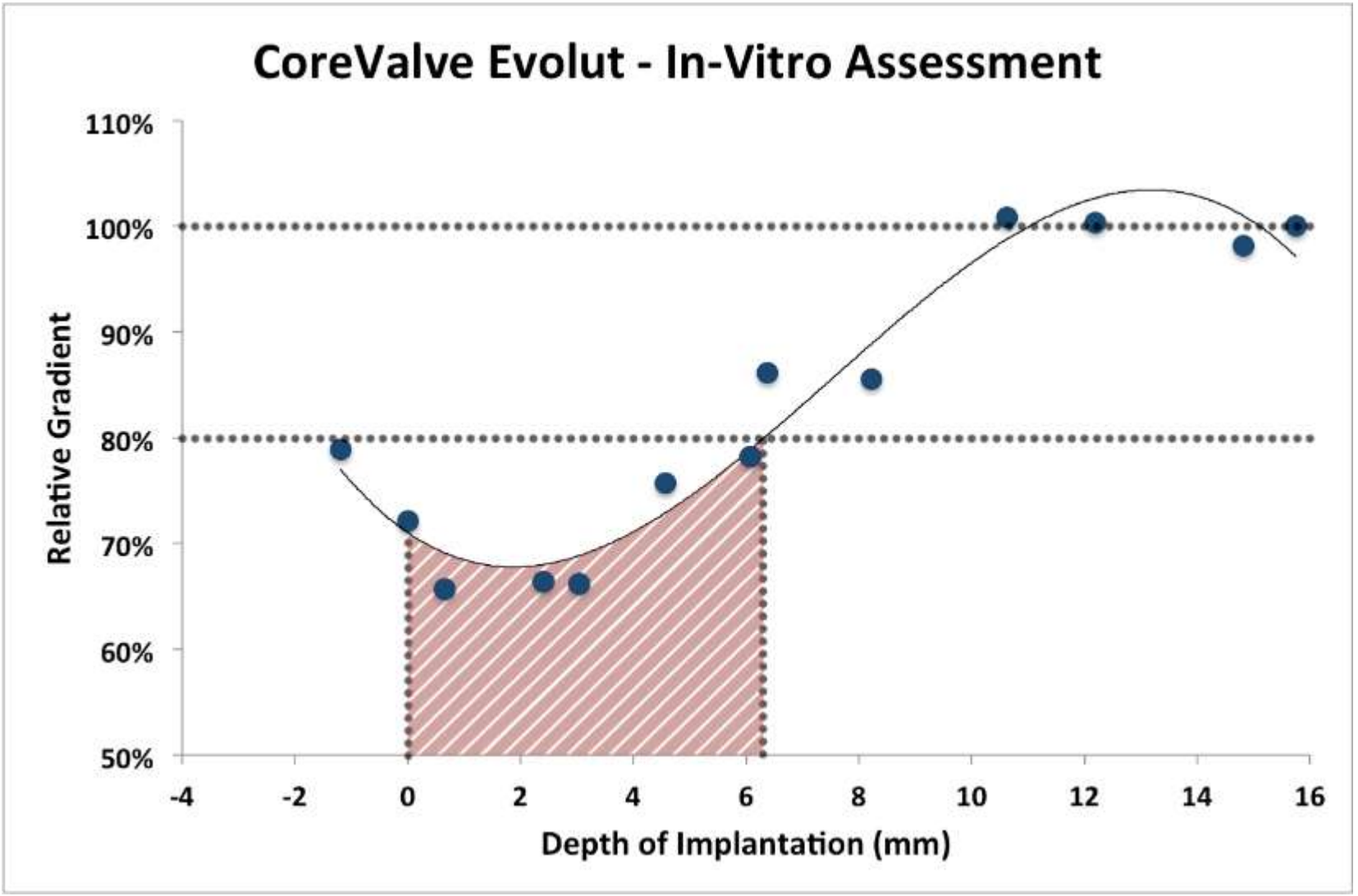

CoreValve Evolut 23mm in Epic #19

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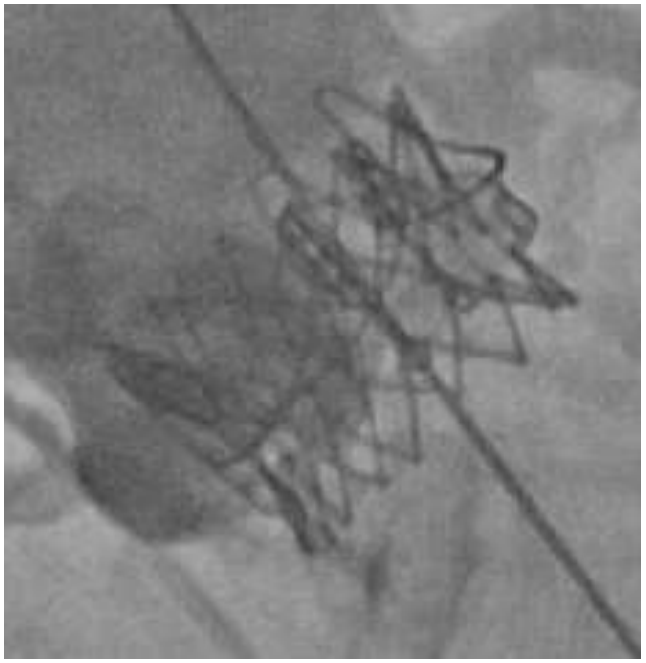
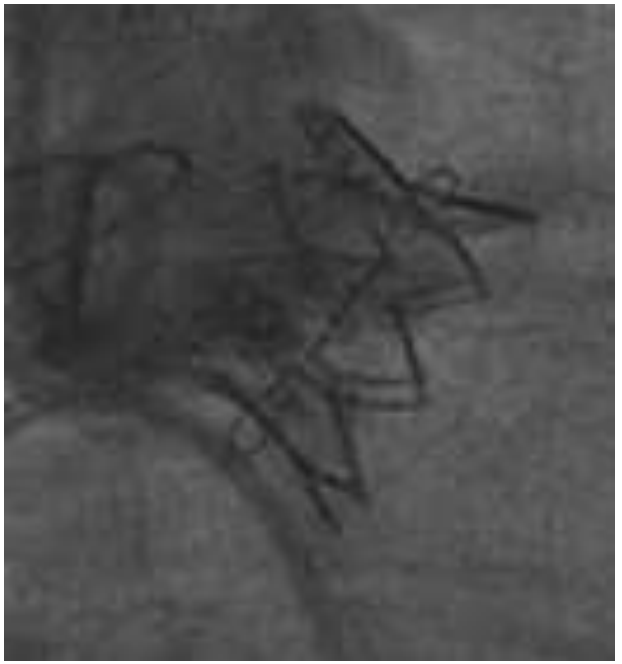
HIGH

LOW





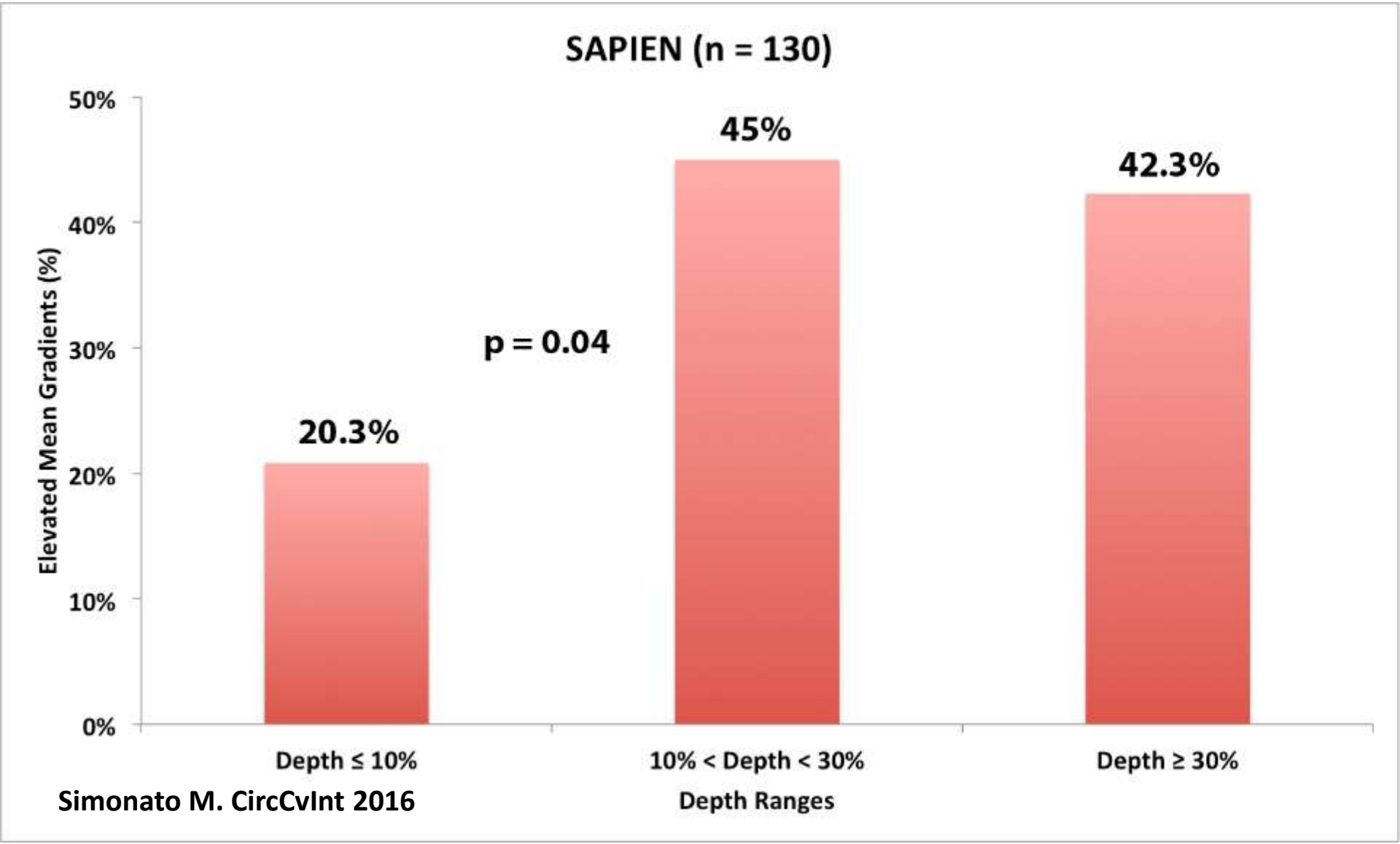
Perimount 21mm
SAPIEN 23mm
Depth: 0.41%
Post mean gradient:17mmHg

Perimount 21mm
SAPIEN 23mm
Depth: 25.41%
Post mean gradient: 33mmHg

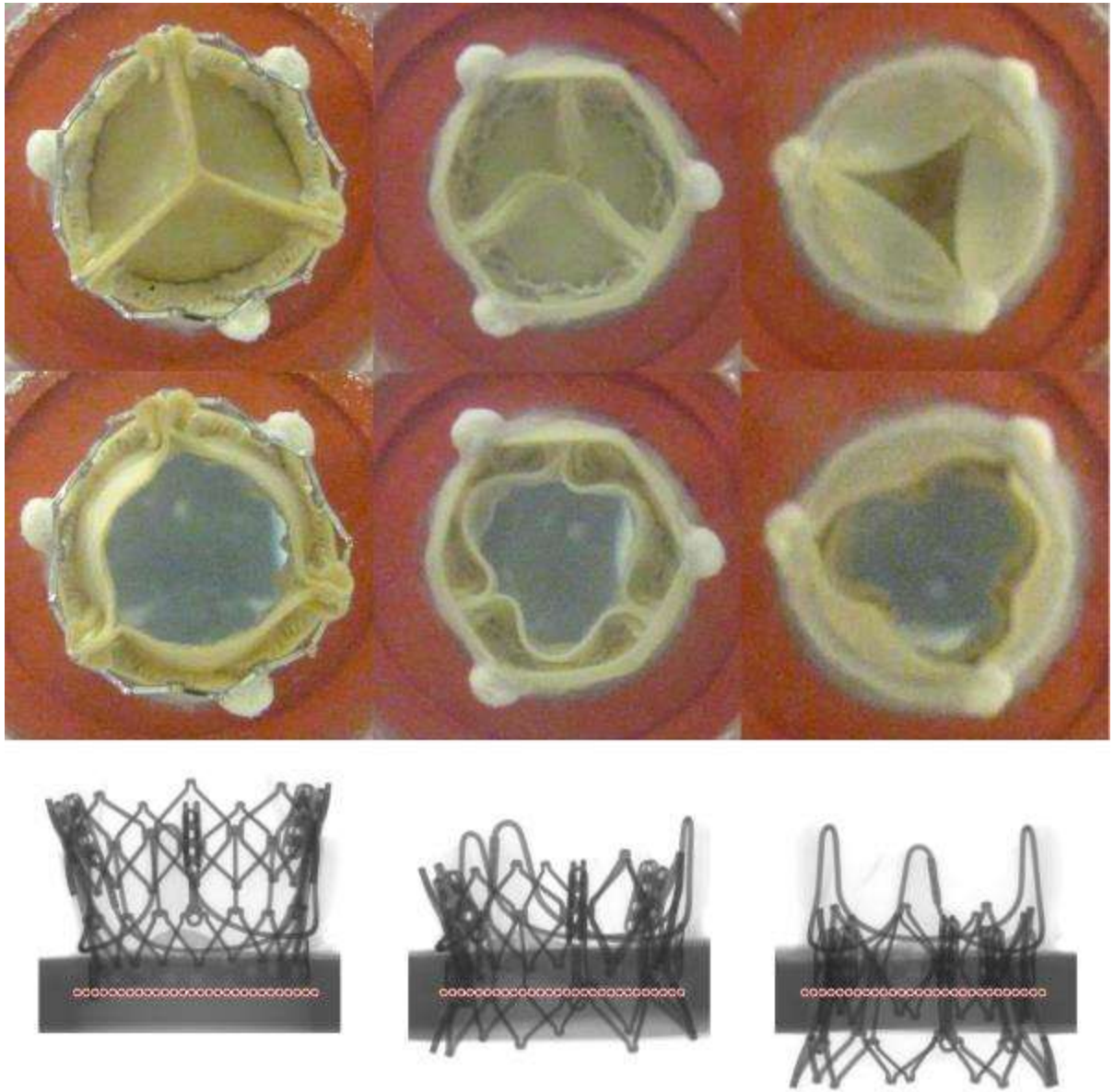
Pericarbon 21mm
SAPIEN 23mm
Depth: 43.93%
Post mean gradient: 50mmHg

Simonato M. CircCvInt 2016

Implantation Depth and Gradients



Simonato M. CircCvInt 2016



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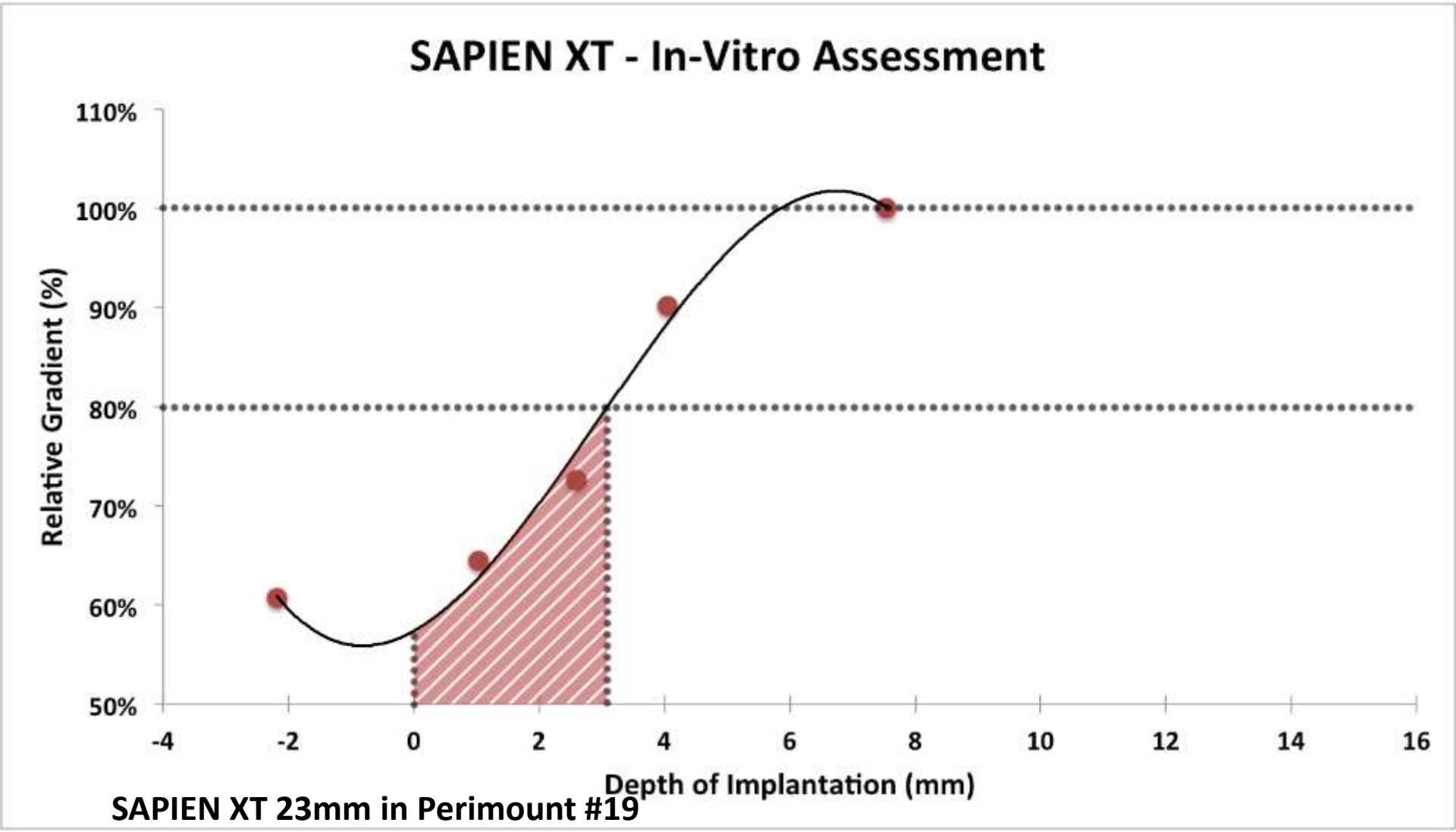

SAPIEN XT 23mm in Perimount #19

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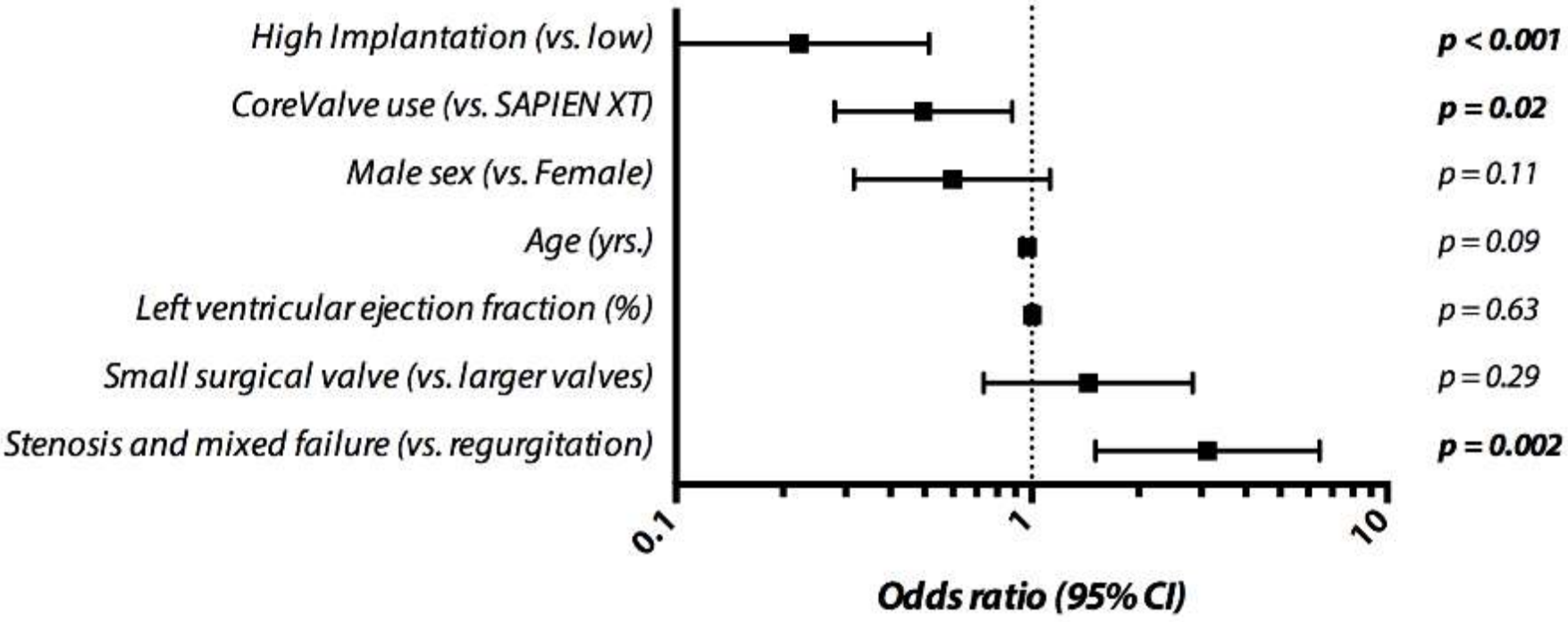
Multivariate Analysis
Elevated Post-Procedural Mean Gradients



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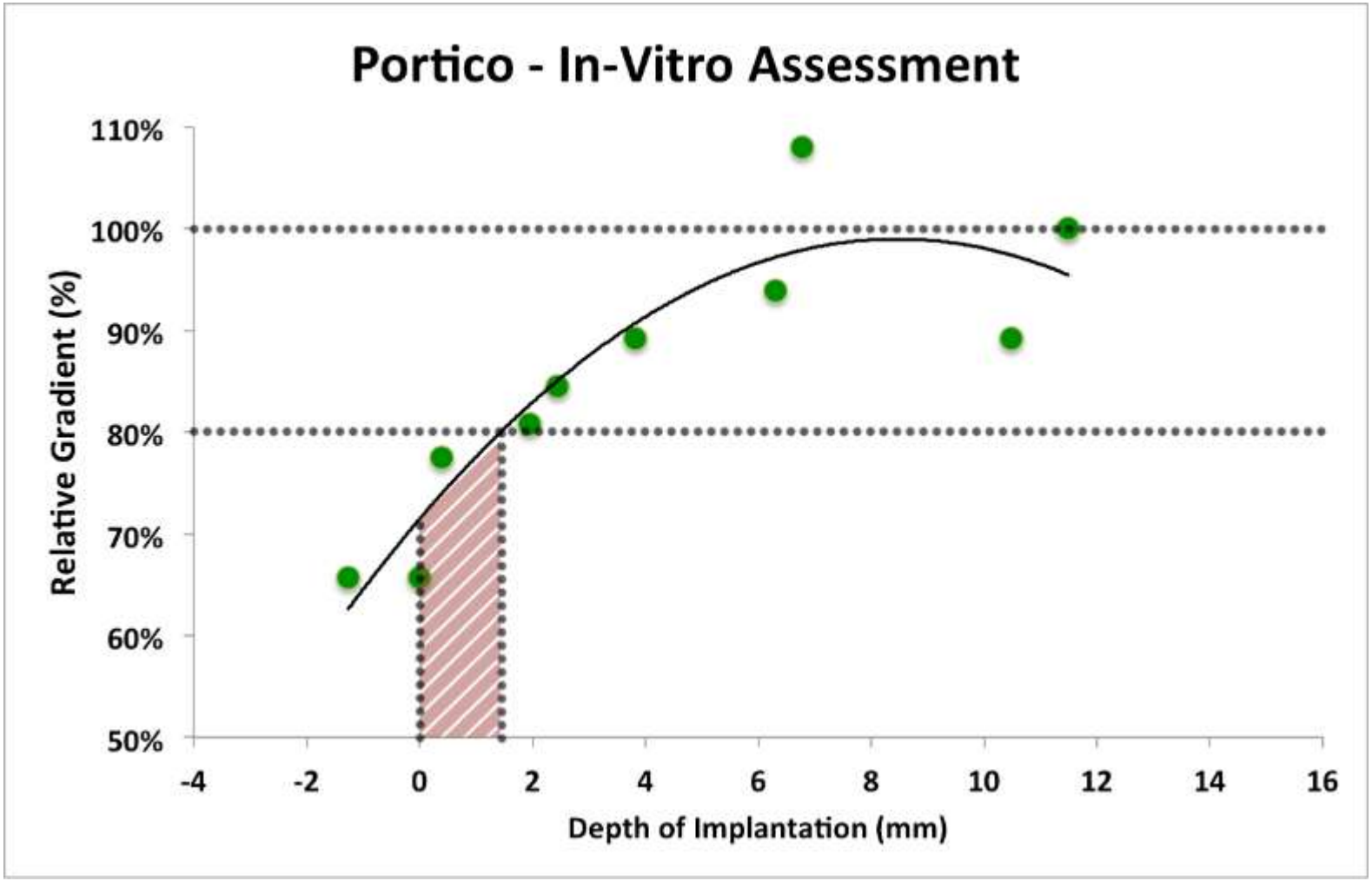

Portico 23mm in Trifecta #19

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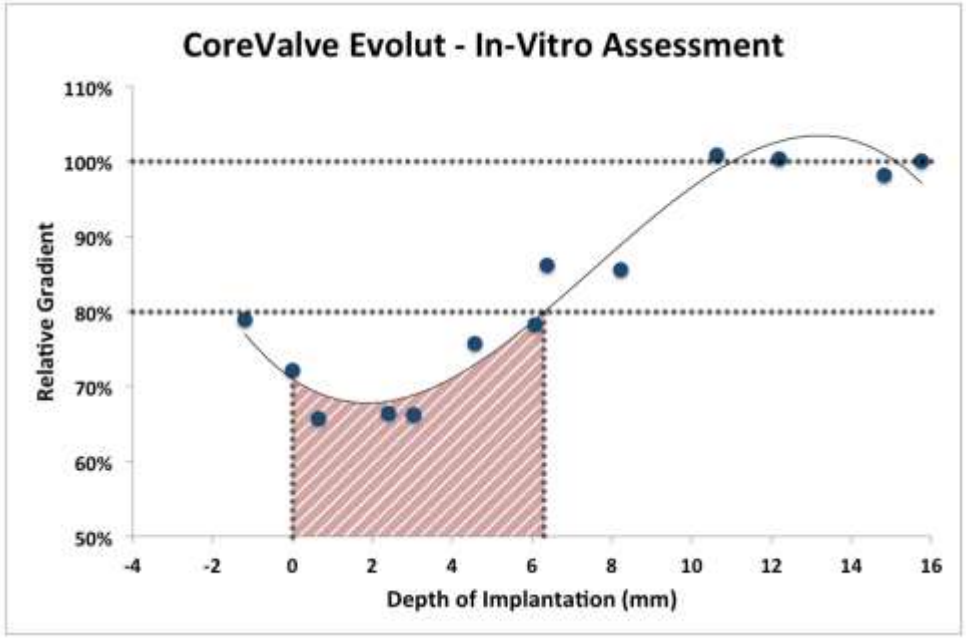
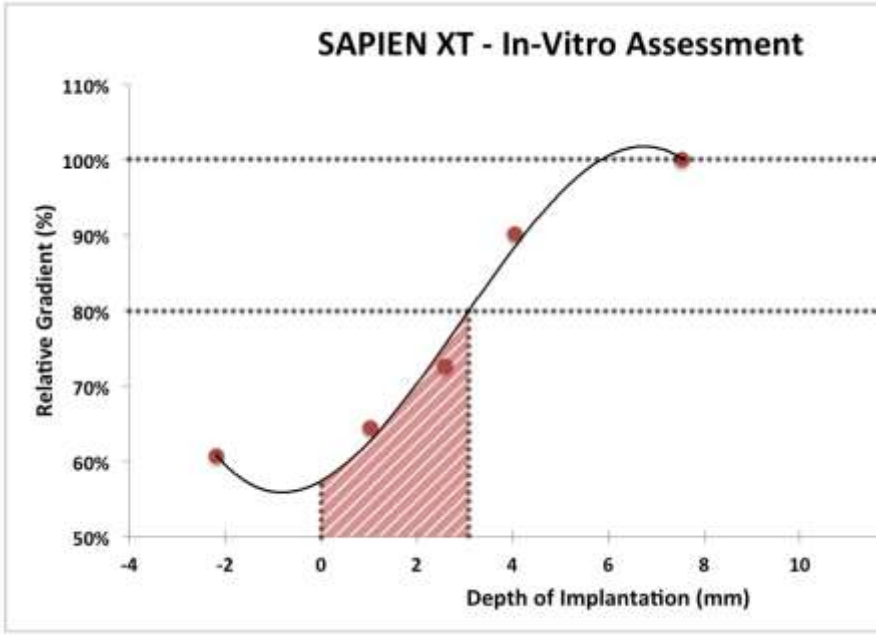
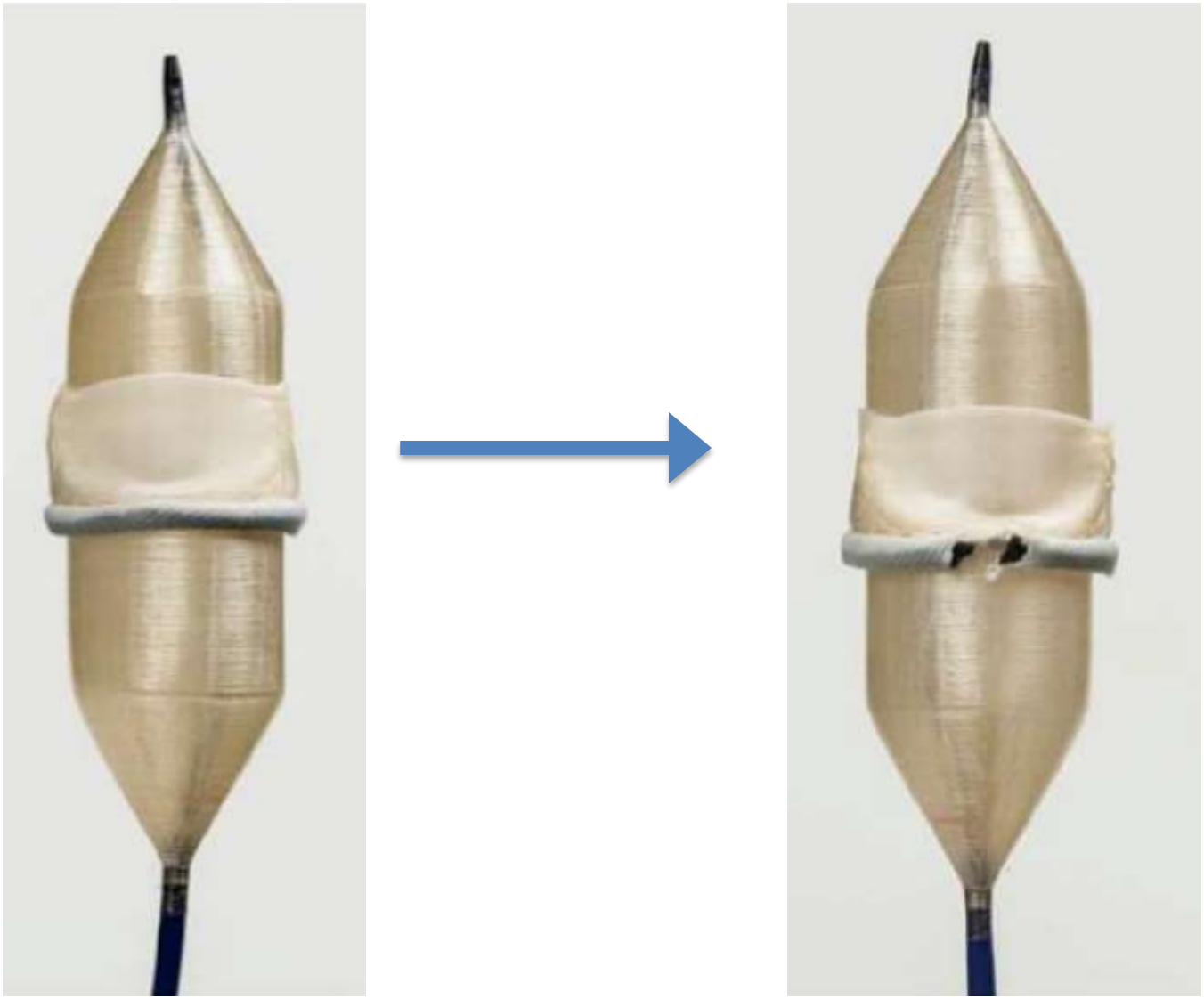
Aortic Valve-in-Valve

CV Evolut R Sapien S3





When there is no option…I will break that ring!



Jens Erik Nielsen-Kudsk. et al. Circ Cardiovasc Interv. 2015

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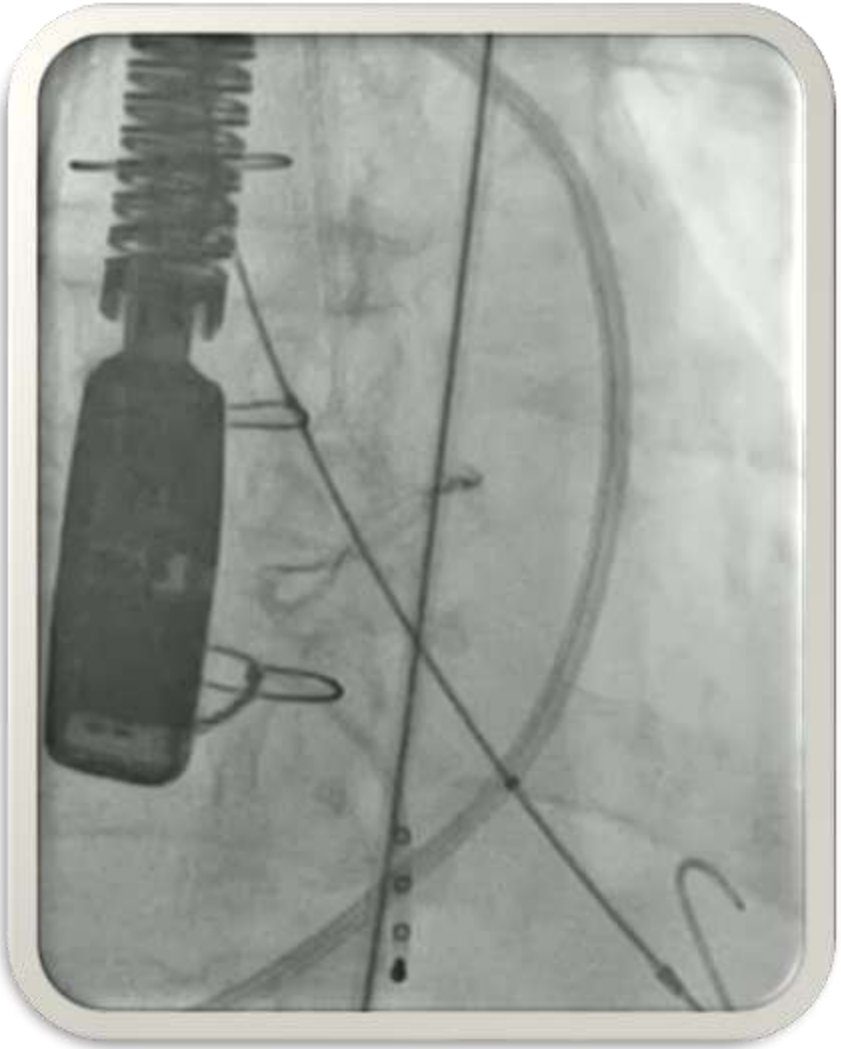
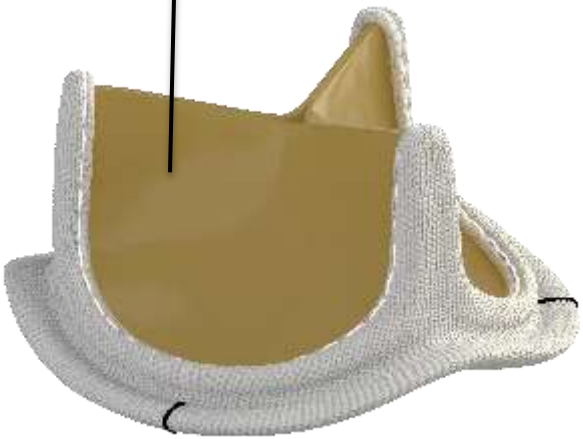


Jens Erik Nielsen-Kudsk. et al. Circ Cardiovasc Interv. 2015

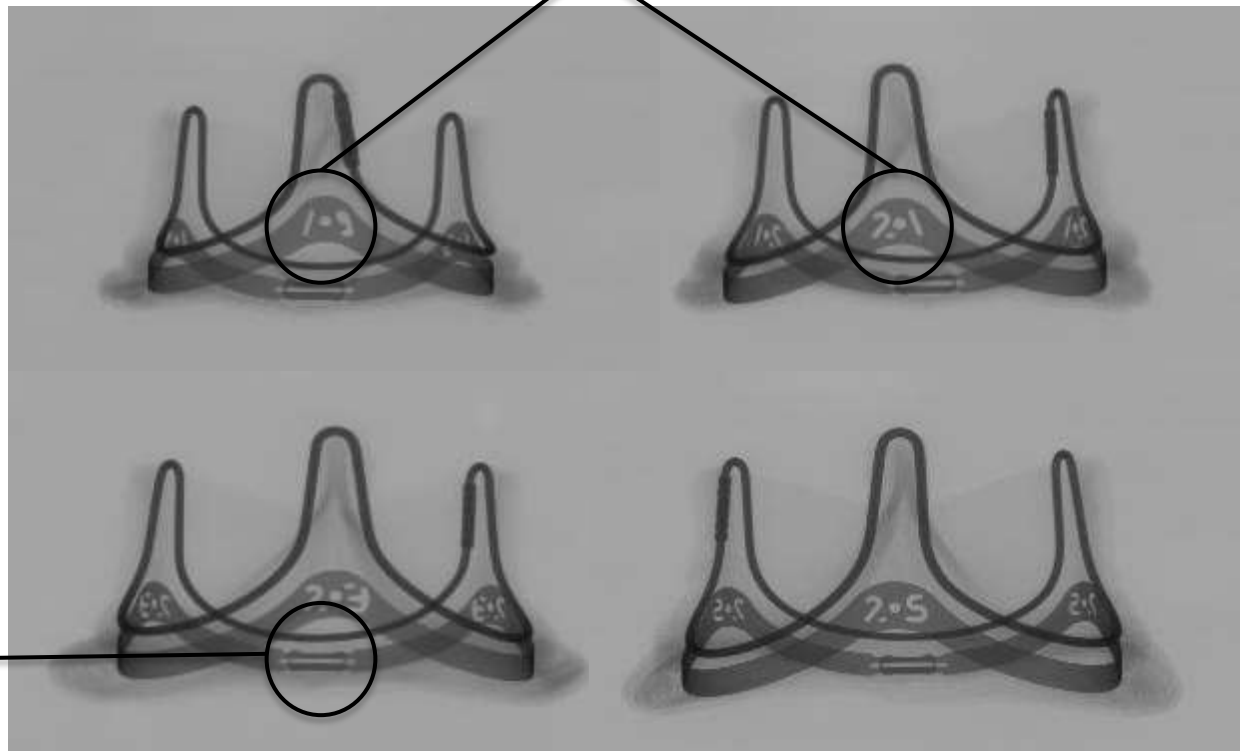
A novel surgical bioprosthesis

The first surgical bioprosthesis specifically designed to enable optimal valve-in-valve, if needed.

new class of bovine pericardial tissue

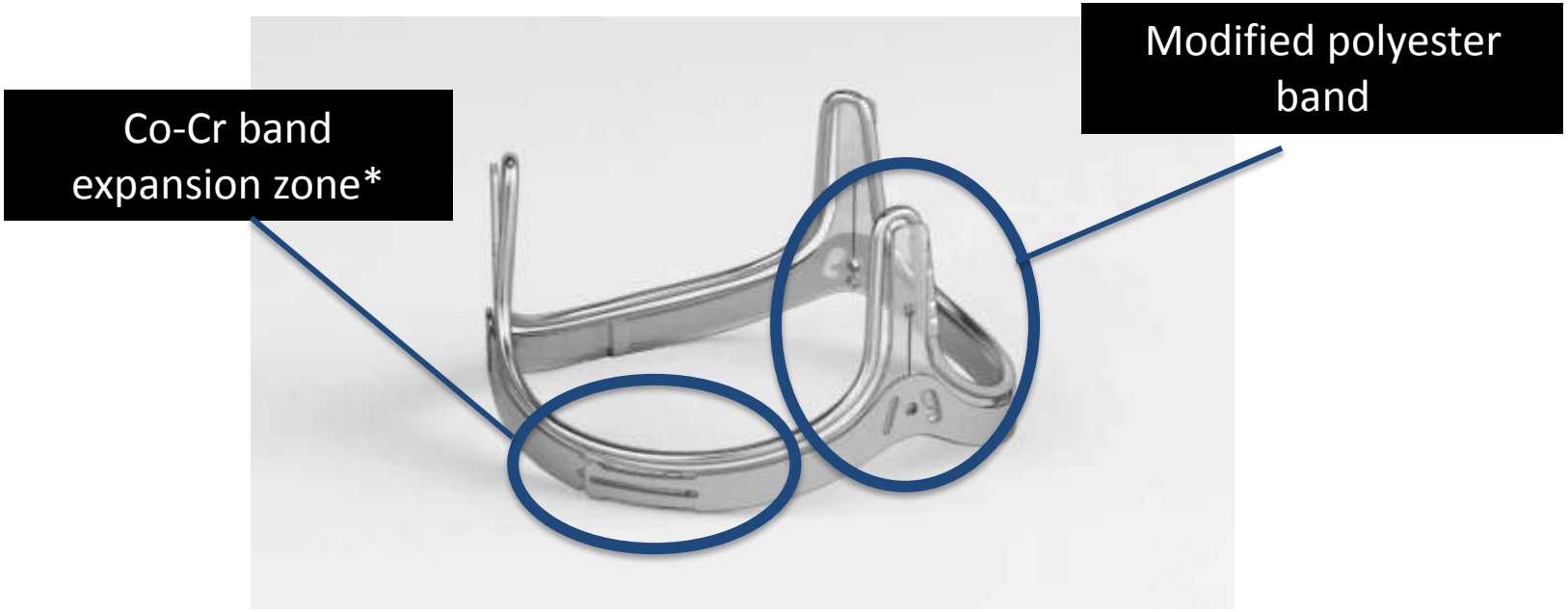


size identifier



Unique expansion mechanism

Expansion mechanism



The Co-Cr band of the valve has an area of expansion to optimize potential future valve-in-valve procedure

*The ends of the CoCr band are secured by a polyester sleeve to maintain a stable diameter at implant and under intracardiac conditions

Conclusions - how to avoid PPM

- Severe PPM of the surgical valve should be excluded before attempting aortic VinV.

- Optimal hemodynamics were achieved with **depth** of:
  - up to **5mm** in **CoreValve/Evolut** implantations
  - up to **3.5mm** in **SAPIEN 3** implantations
  - up to **2mm** in **SAPIEN XT/Portico** implantations

- The above depths should be approached by all valve-in-valve operators, **especially** in cases performed in **small surgical valves**, in order to enable best device performance.

- The safety of breaking the surgical valve ring with a non-compliant balloon will be further studied.

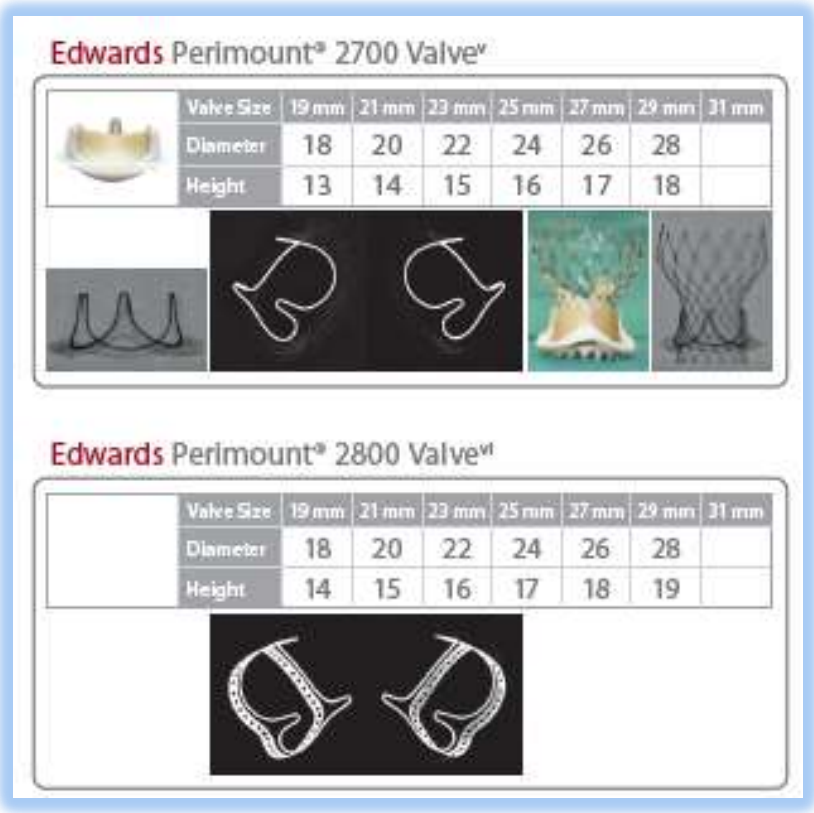
- Novel surgical valves may enable unique opportunity to perform effective valve in valve, if required.

Valve in Valve Pre Procedure

1. Identify the failed SAV

2. Determine SAV mode of failure

3. Determine (inside) diameter of the SAV
   - Cross reference valve model and size to SAV specifications
   - Image the failed SAV to measure its annulus diameter
   - Compare internal diameter specification to measured diameter to confirm the annulus diameter
   - Use the smaller of the manufacturer's and measured diameters[1]



Edwards Perimount® 2700 Valve[v]

Valve Size	19 mm	21 mm	23 mm	25 mm	27 mm	29 mm	31 mm
Diameter	18	20	22	24	26	28	
Height	13	14	15	16	17	18	

Edwards Perimount® 2800 Valve[vi]

Valve Size	19 mm	21 mm	23 mm	25 mm	27 mm	29 mm	31 mm
Diameter	18	20	22	24	26	28	
Height	14	15	16	17	18	19	

Valve-in-valve

Case Presentations
With
Coronary Protection

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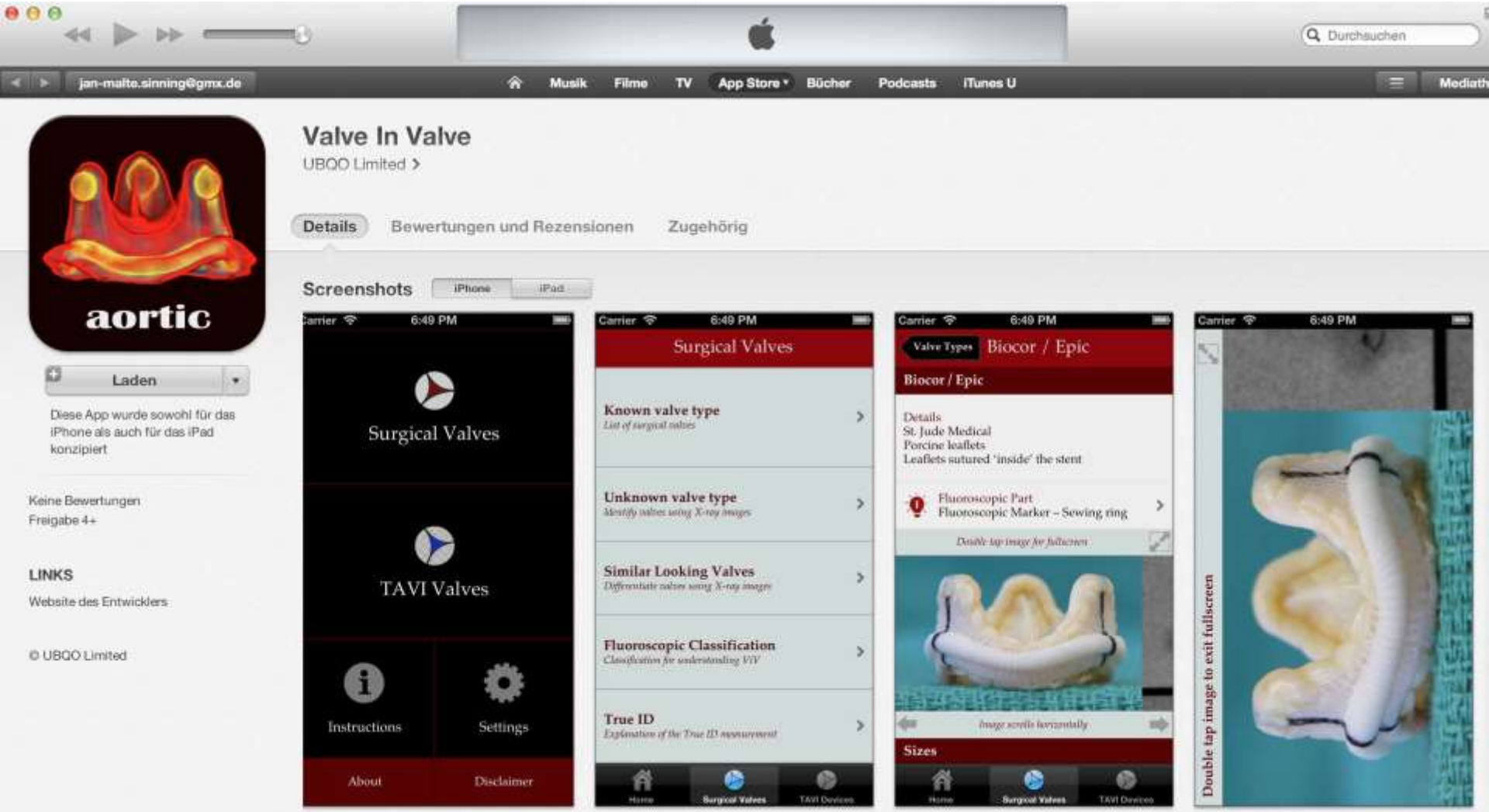
iPhone App “valve-in-valve”



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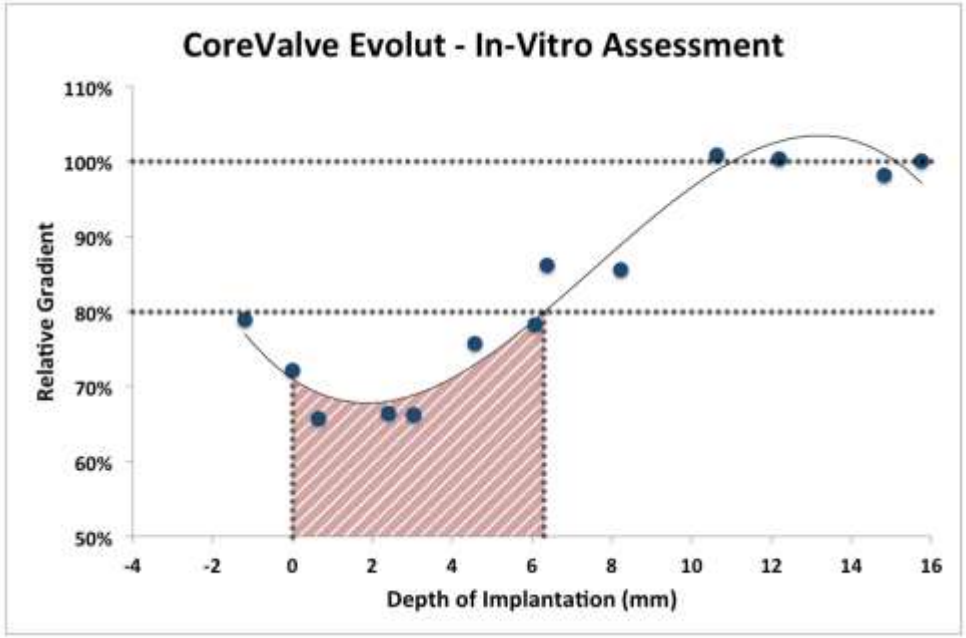
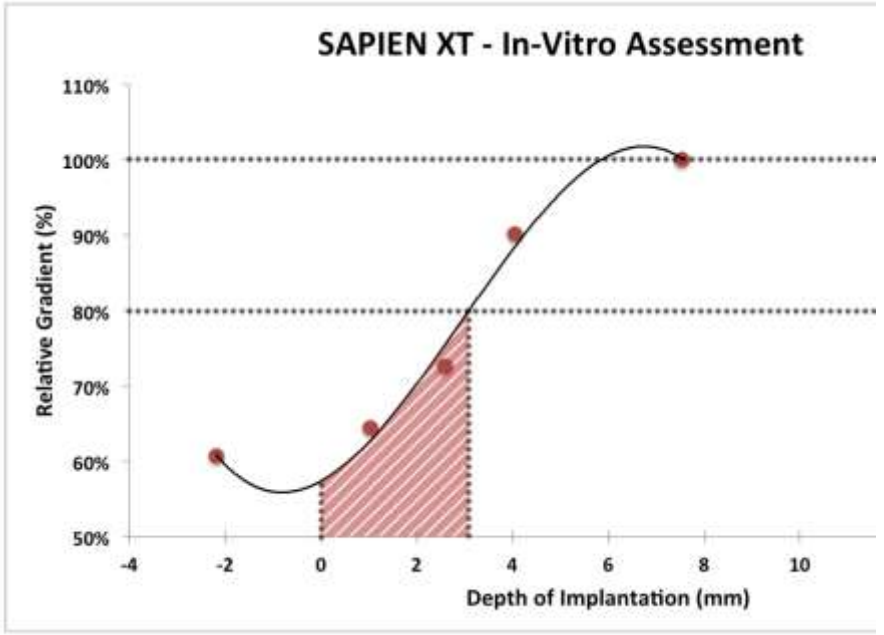
Aortic Valve-in-Valve

CV Evolut R Sapien S3





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Case No. 1

TAVI - ViV

Evolut R 23 in a Perimount 21

Transfemoral ViV

Patient Demographics

Age: 71 years
Gender: female

Past Medical History

2-vessel coronary artery disease
Persistent atrial fibrillation
- CHADS-VASc score: 7

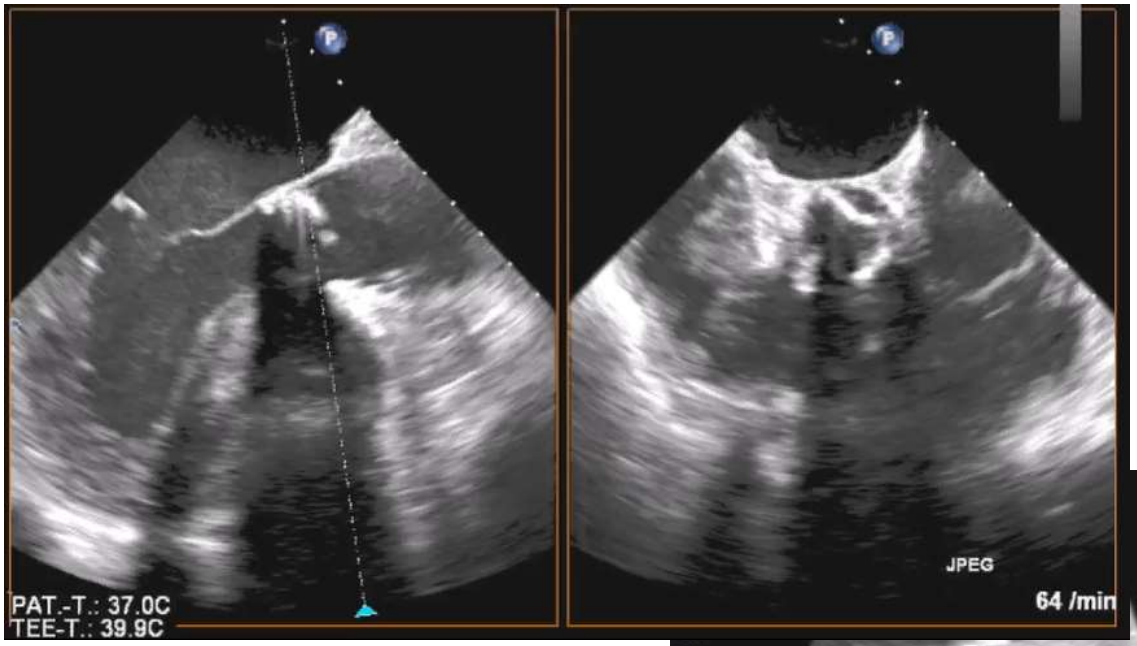
Diabetes mellitus
Arterial hypertension

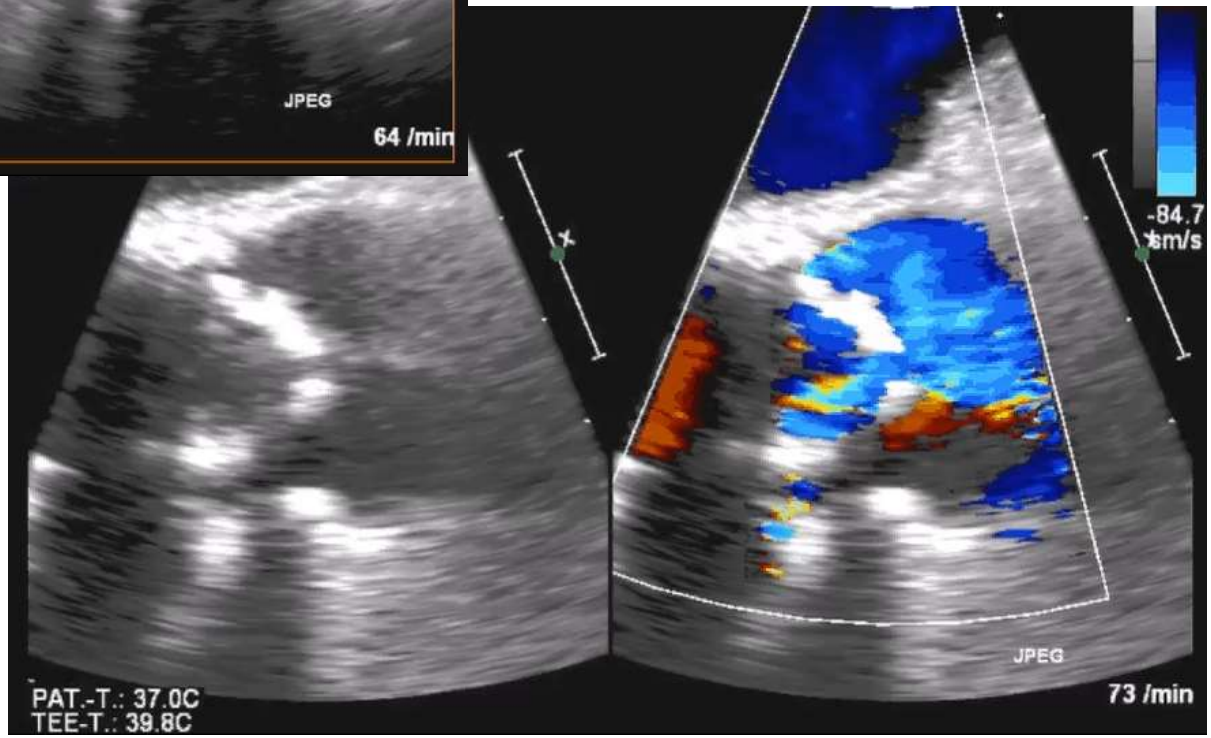
Past Surgical history

05/2004 SAVR (Perimount 21 mm)
12/2016 Primary PCI LCX (NSTEMI)

Clinical Presentation

Dyspnea NYHA III


PAT.-T.: 37.0C
TEE-T.: 39.9C
JPEG
64 /min


-84.7
cm/s
PAT.-T.: 37.0C
TEE-T.: 39.8C
JPEG
73 /min

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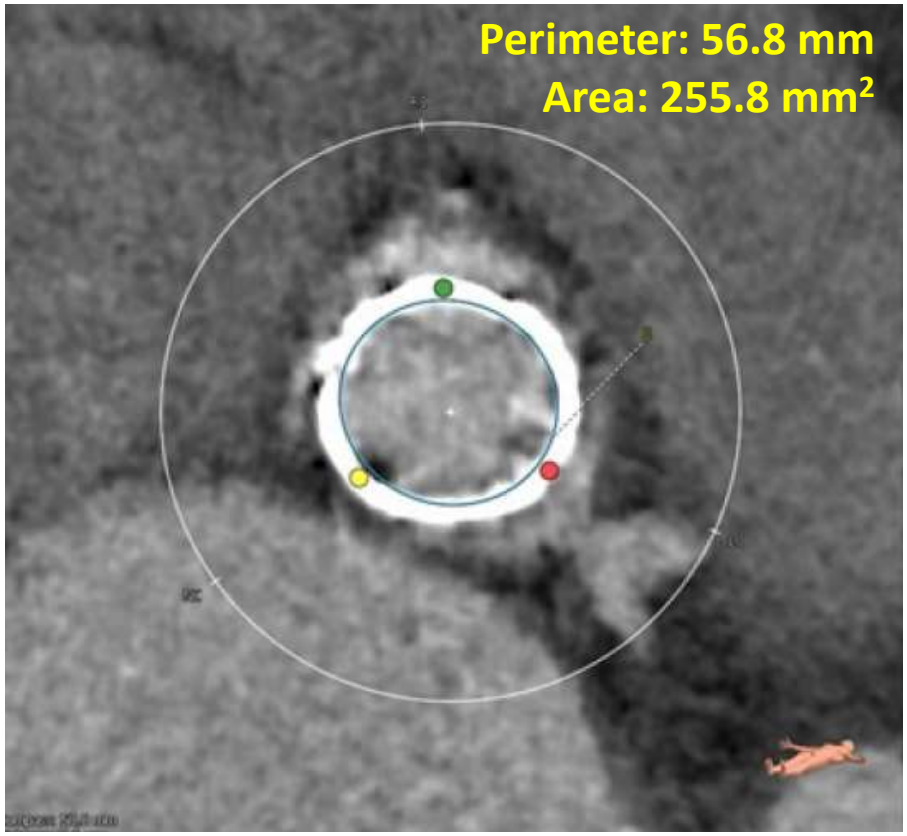
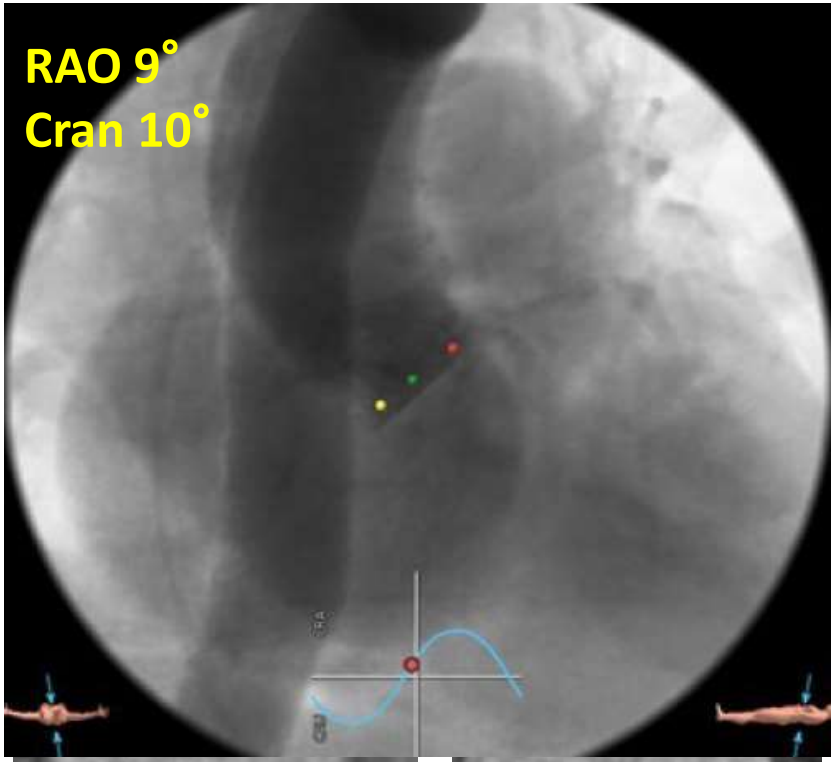
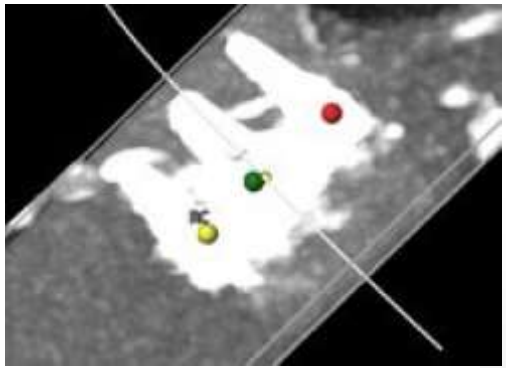
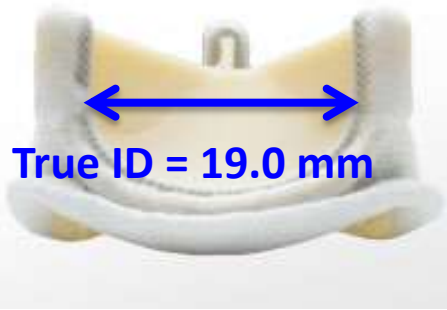
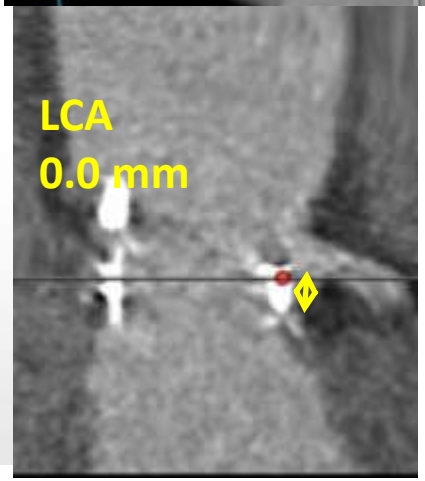
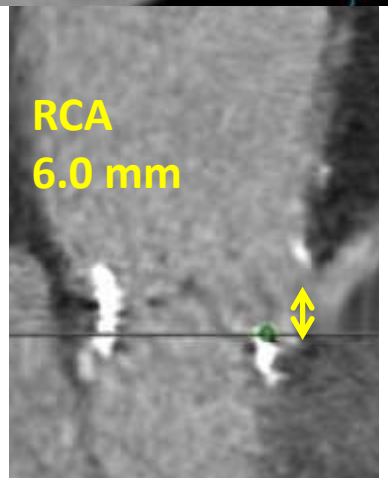


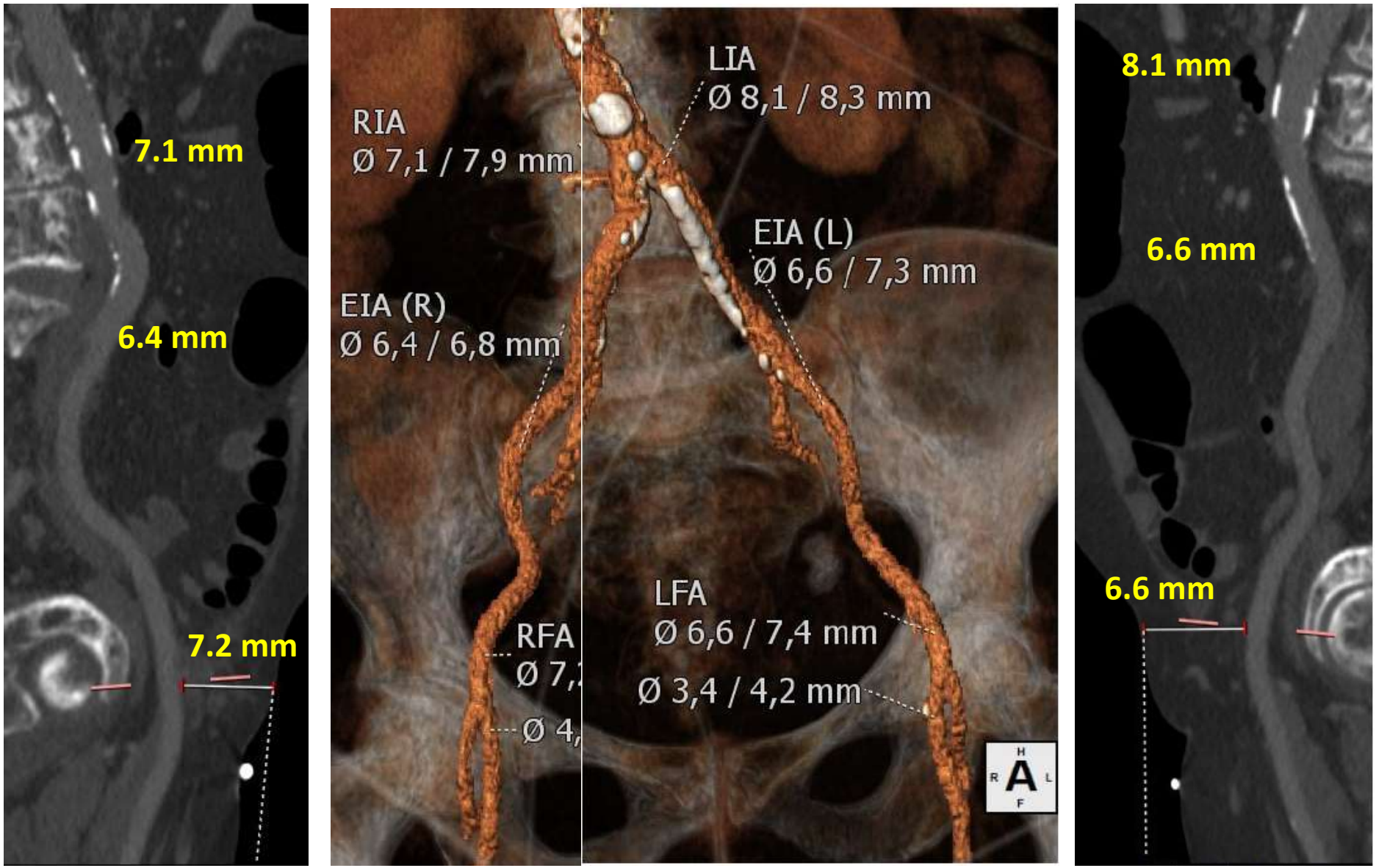











7.1 mm
6.4 mm
7.2 mm
RIA
Ø 7,1 / 7,9 mm
EIA (R)
Ø 6,4 / 6,8 mm
RFA
Ø 7,
Ø 4,
LIA
Ø 8,1 / 8,3 mm
EIA (L)
Ø 6,6 / 7,3 mm
LFA
Ø 6,6 / 7,4 mm
Ø 3,4 / 4,2 mm
H
R A L
F
8.1 mm
6.6 mm
6.6 mm

Transfemoral VIV

Imaging Studies

Echo: EF 40%, V_{max} 4.8 m/s, AVA 0.9 cm^2, annulus 20 mm, MR 2

Cath: 2-vessel-CAD

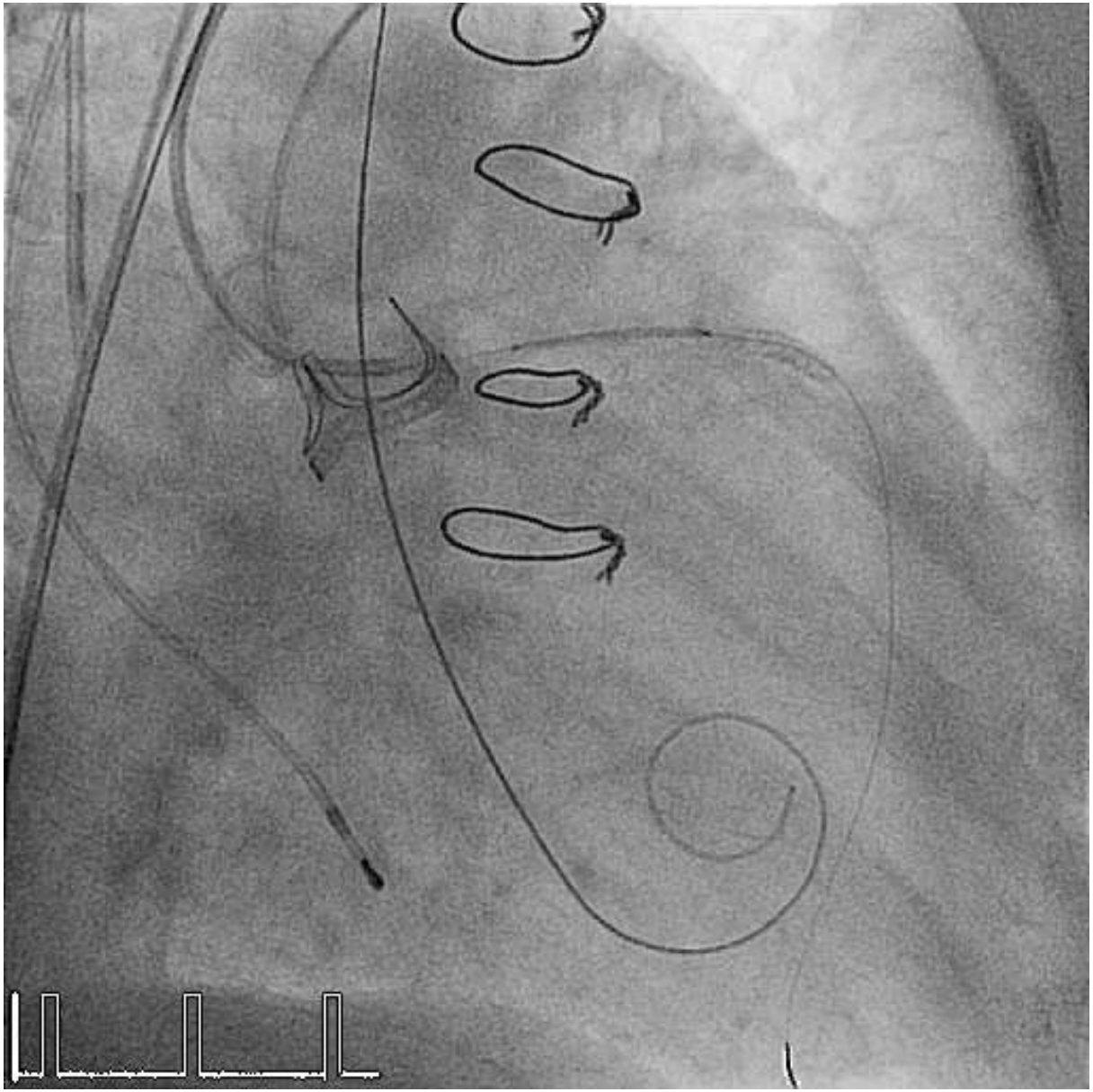
CT: Aortic annulus 17.4 x 18.7 mm, perimeter 56.8 mm, ***very low*** distance to coronaries (LCA: 0mm, RCA: 6mm)

Clinical Indication

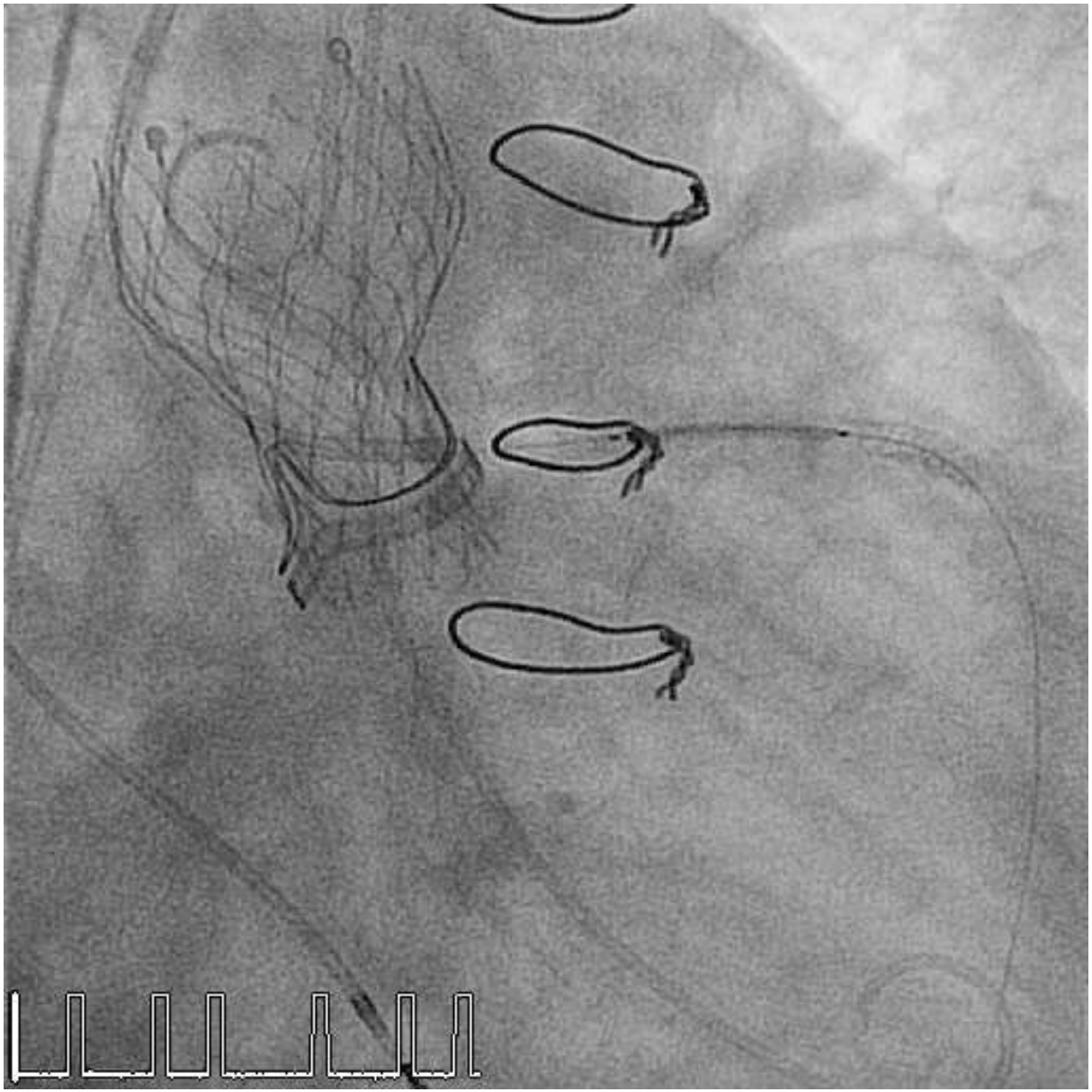
Severe aortic stenosis with comorbidities (log. EuroSCORE 25.29%, STS score 3.93%); Heart Team decision

Procedural Strategy

Transfemoral valve-in-valve implantation with Evolut R 23mm into Perimount 21 mm ***(officially NOT recommended – off-label use!)***



Final Result, Stent not placed



Case No. 2

TAVI - ViV

Evolut R 23 in a Mitroflow 23

herz
zentrum
bonn

Transfemoral ViV

Patient Demographics

Age: 64 years
Gender: male

Past Surgical History

09/2006 SAVR with Mitroflow 23mm

Past Medical History

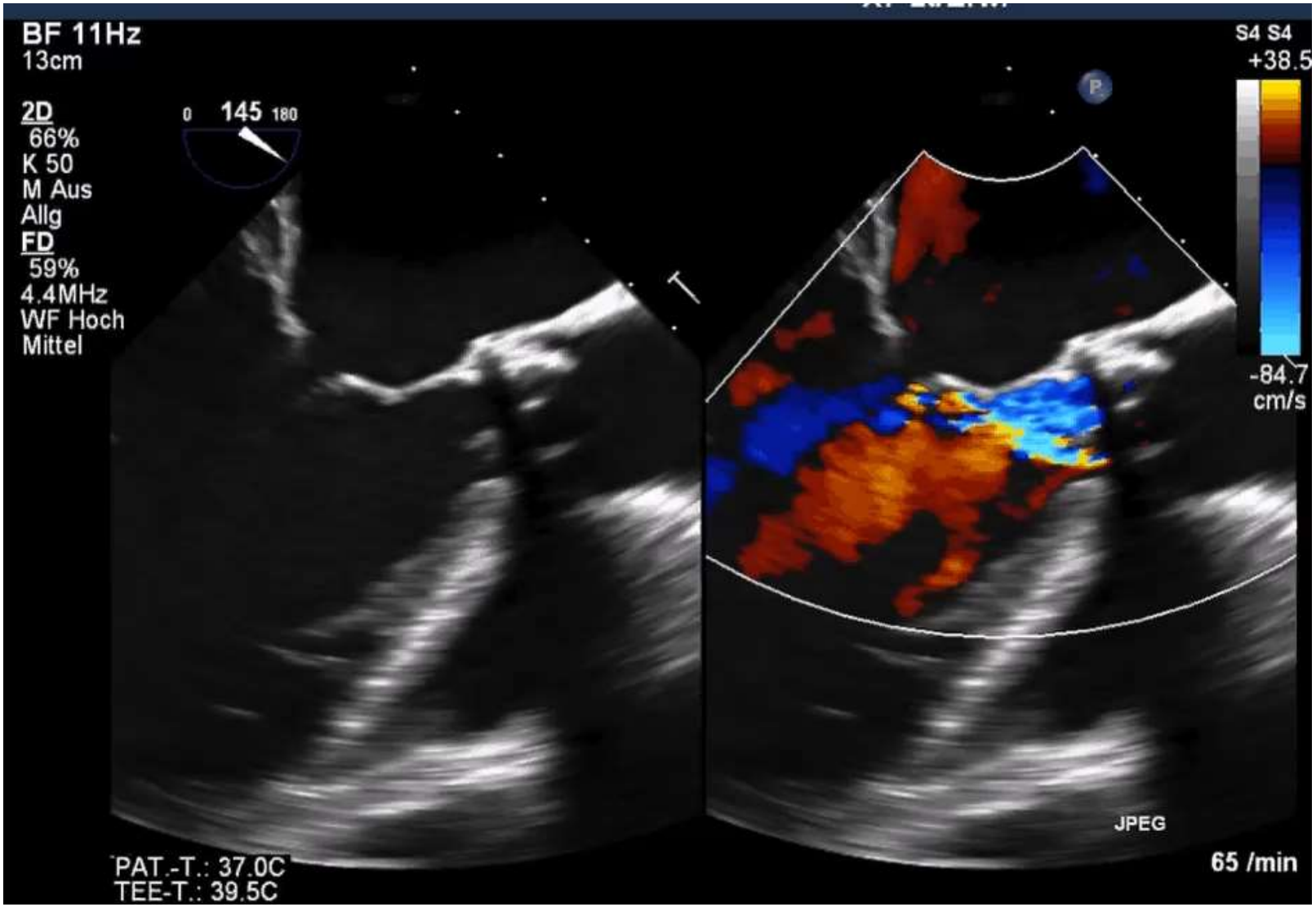
2 vessel CAD
- DES ad LAD 02/2016

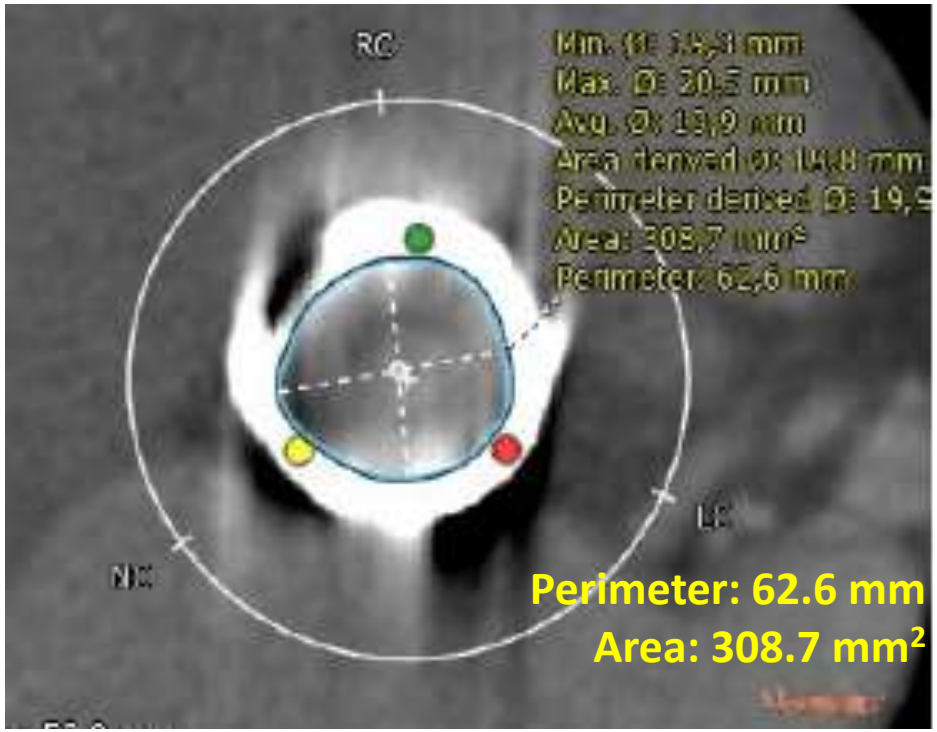
Peripheral arterial disease IIa
Multifocal hepatocellular carcinoma
- liver cirrhosis Child A
- palliative strategy

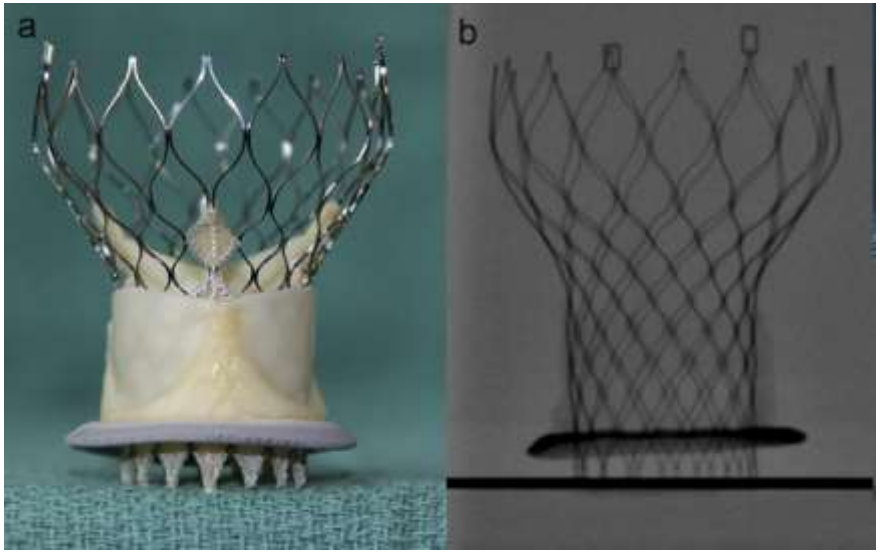
Hepatitis C

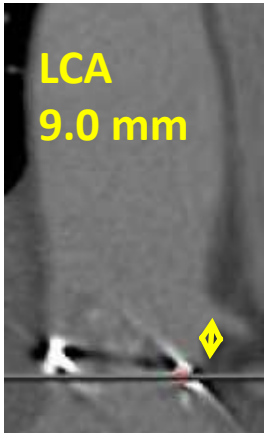
Clinical Presentation

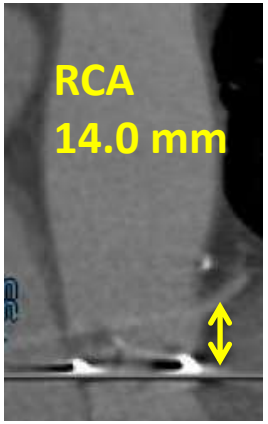
Dyspnea NYHA III-IV
Peripheral oedema

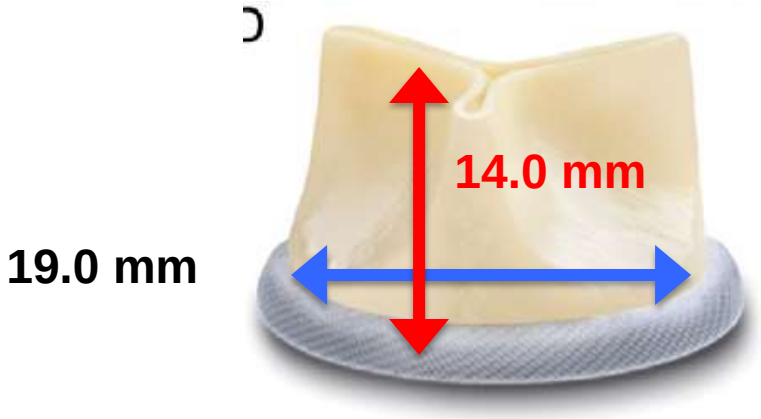

BF 11Hz
13cm
2D
66%
K 50
M Aus
Allg
FD
59%
4.4MHz
WF Hoch
Mittel
0
145
180
S4 S4
+38.5
-84.7
cm/s
JPEG
PAT.-T.: 37.0C
TEE-T.: 39.5C
65 /min



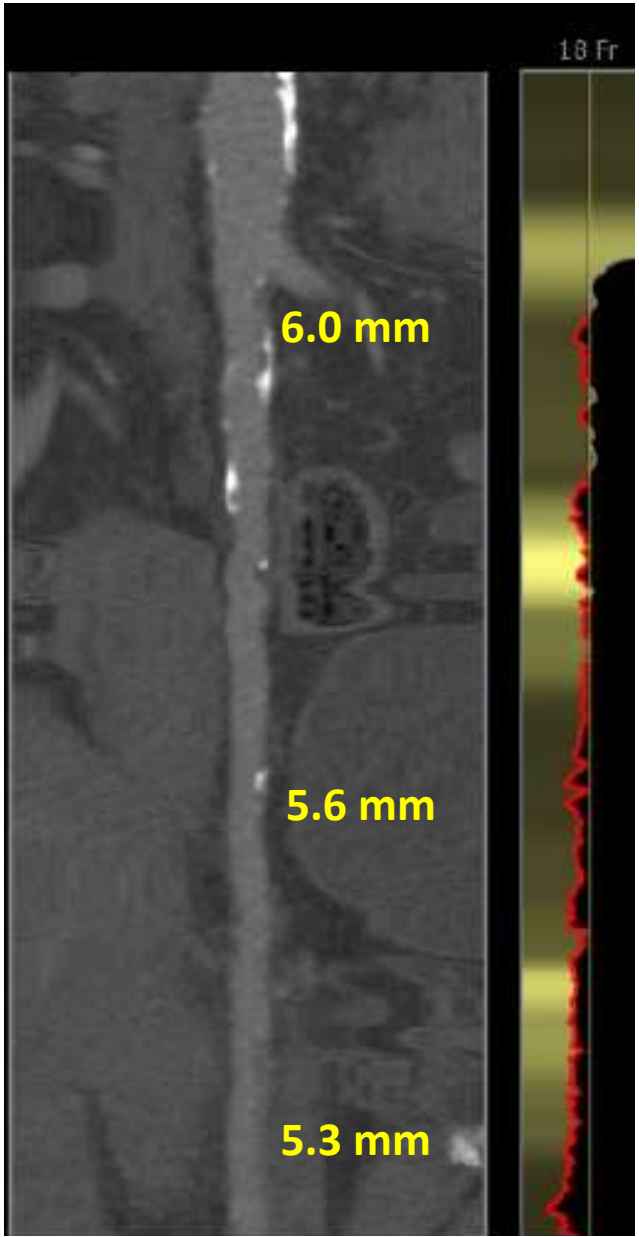


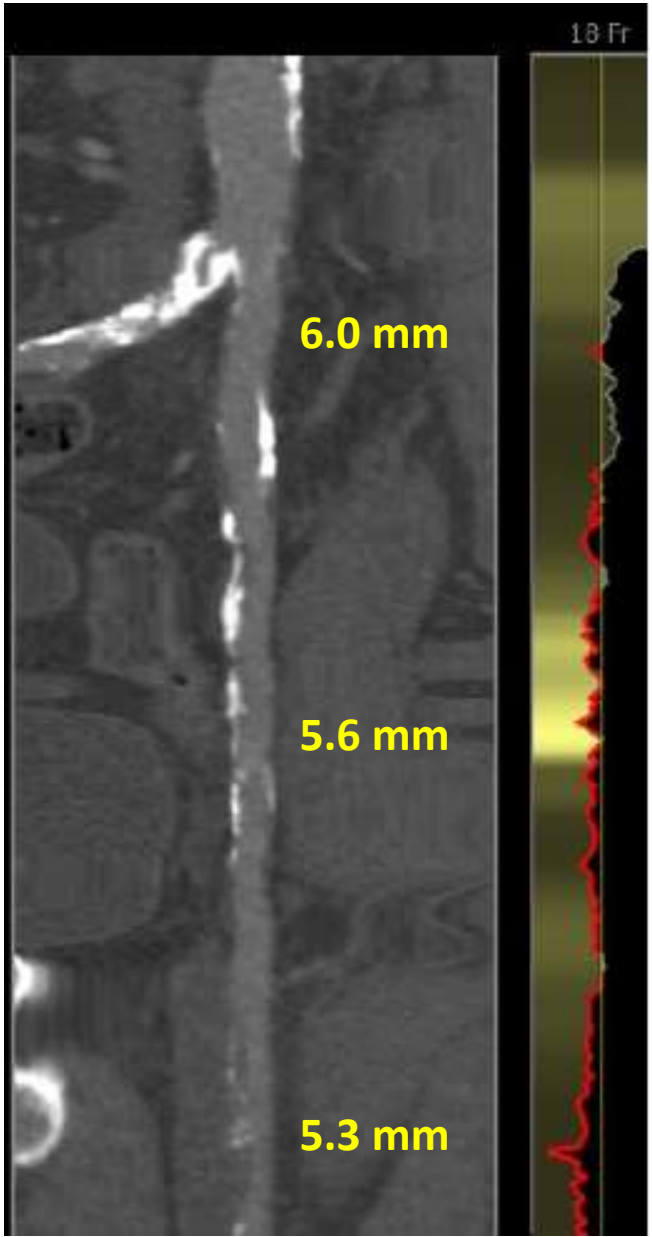






Mitroflow 23mm


18 Fr
6.0 mm
5.6 mm
5.3 mm


18 Fr
6.0 mm
5.6 mm
5.3 mm

Transfemoral ViV

Imaging Studies

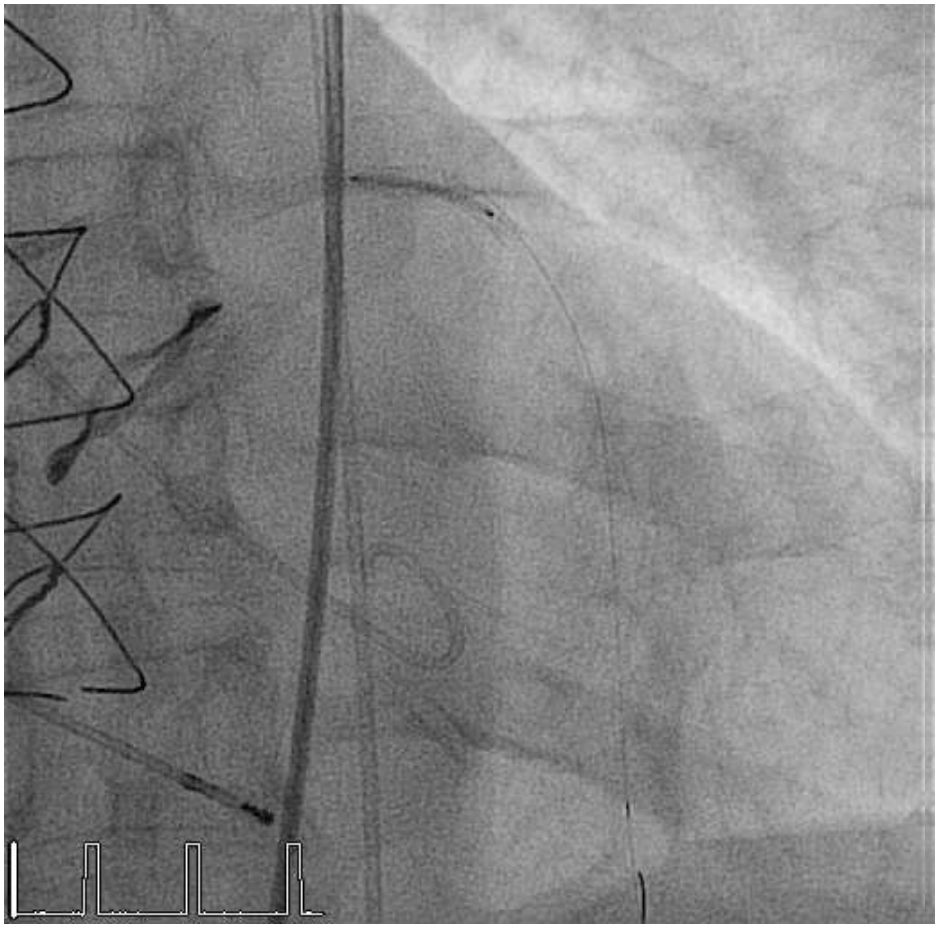
Echo: EF 52%, AR III°, MR II°, sPAP: 55mmHg
Cath: 2 vessel CAD
CT: Mitroflow 23mm: True ID 19mm,
LCA 9mm, RCA 14mm

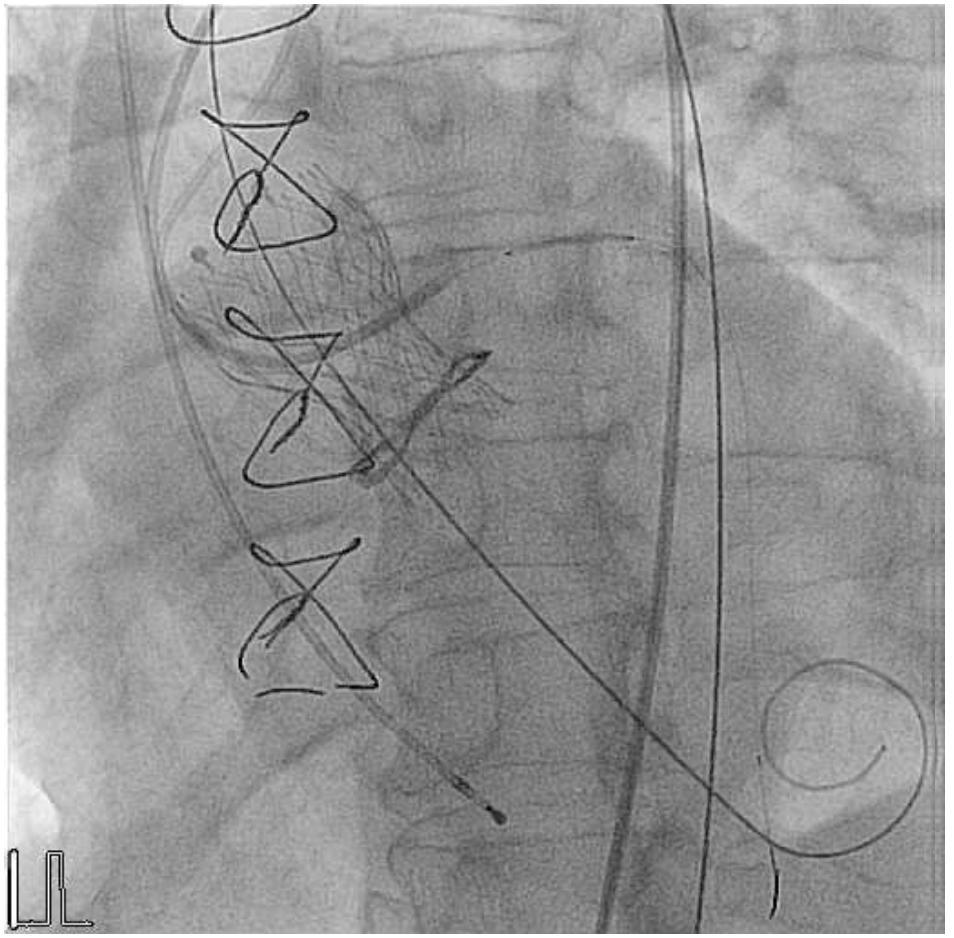
Clinical Indication

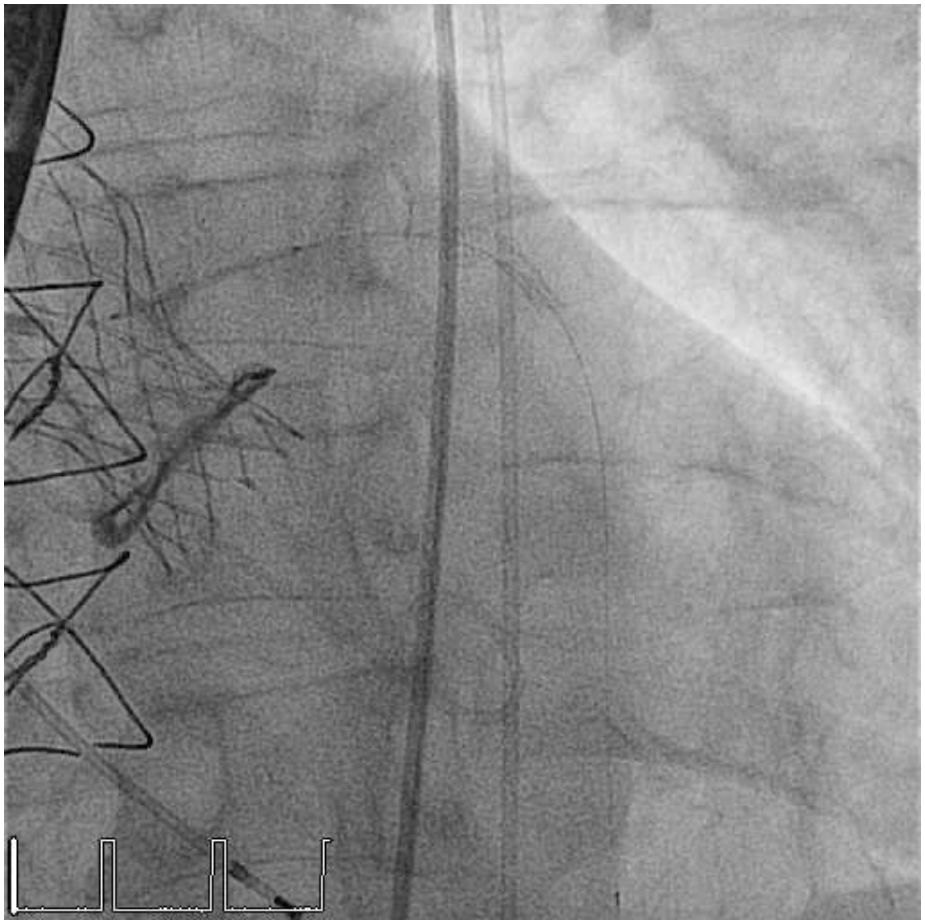
Severe aortic regurgitation with comorbidities (log. EuroSCORE 19.44%, STS score 2.9%), Heart Team decision

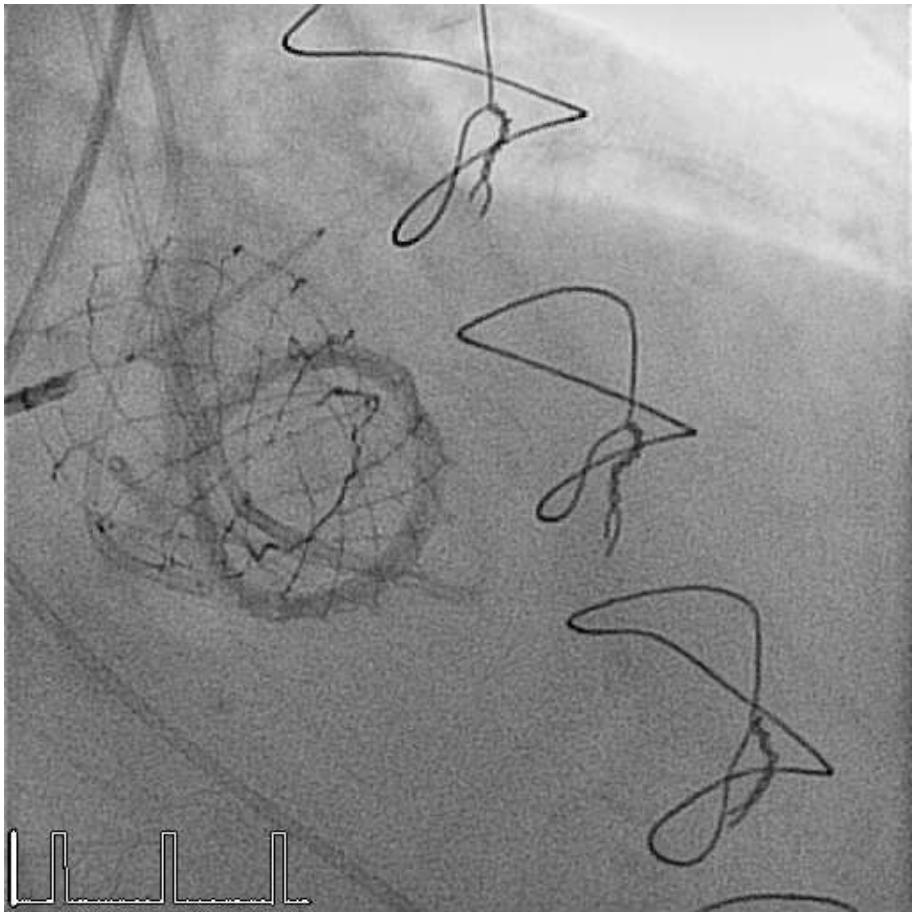
Procedural Strategy

Transfemoral ViV with Evolut R 23 mm prosthesis
Coronary protection

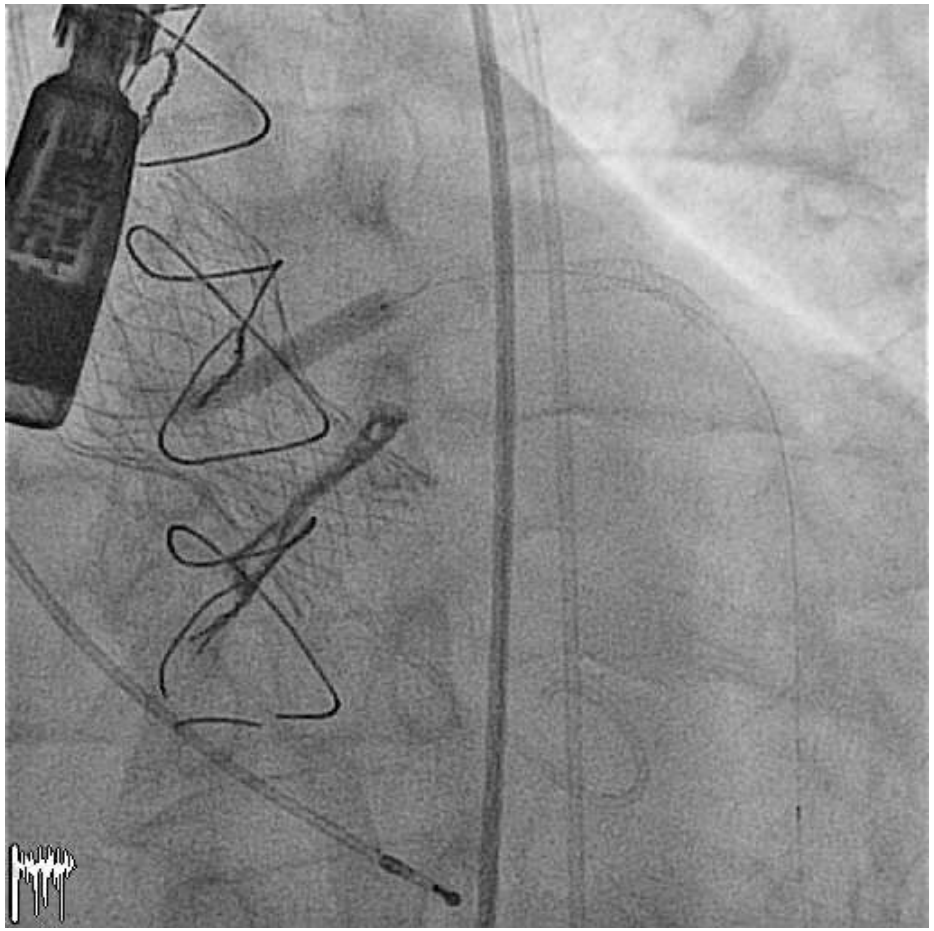


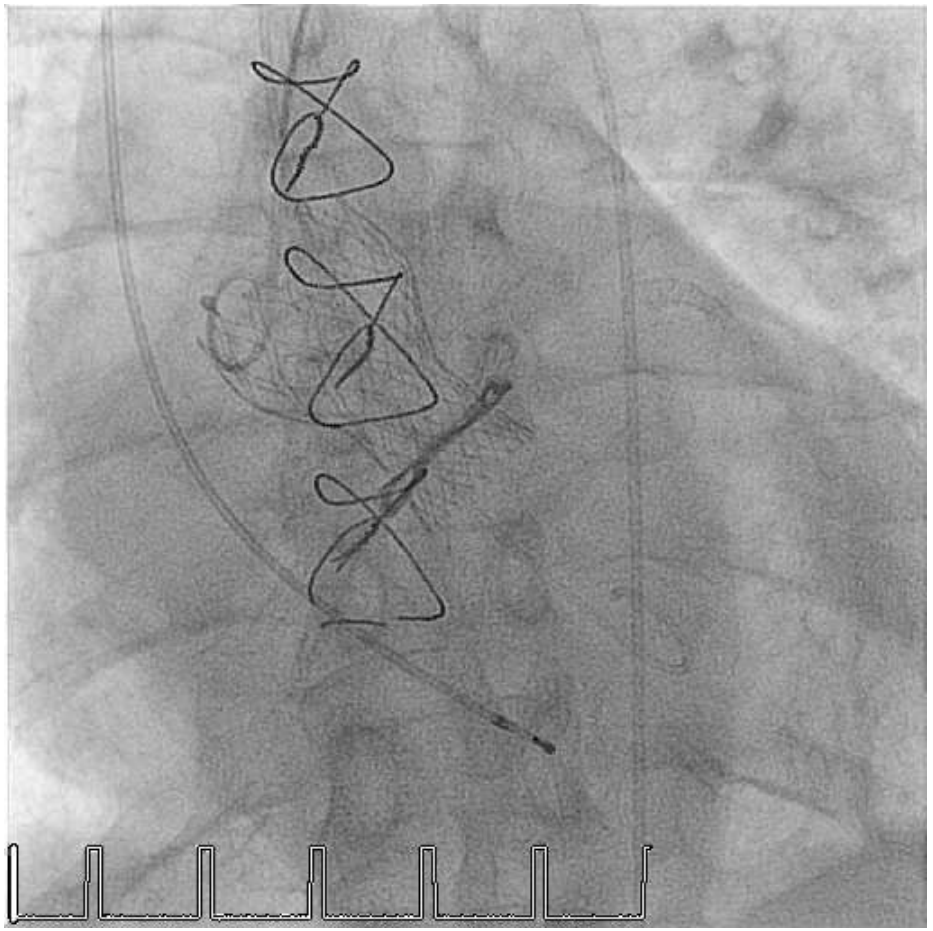






Final Result, Stent placed





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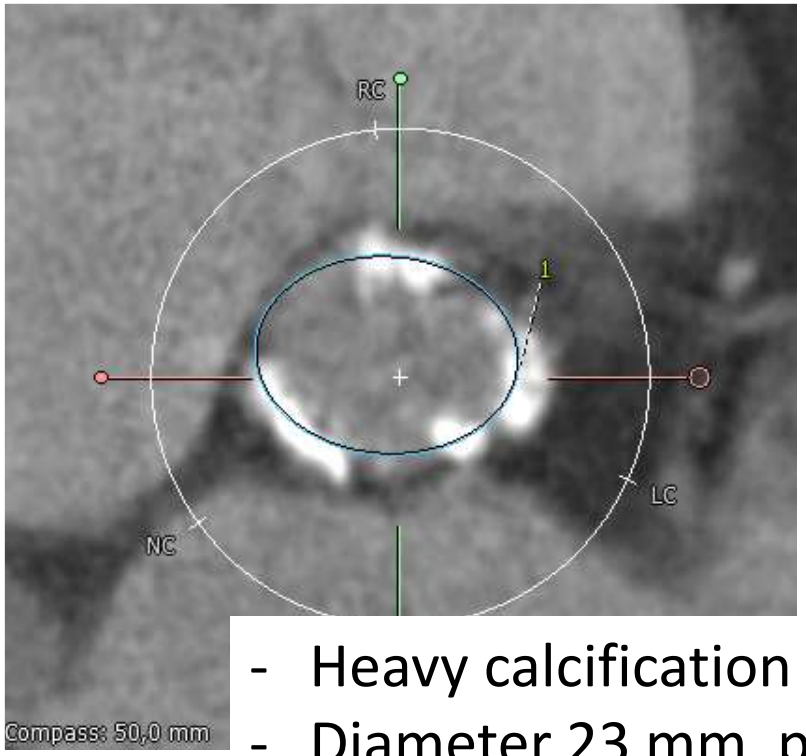
ICCI
international center for
cardiovascular interventions

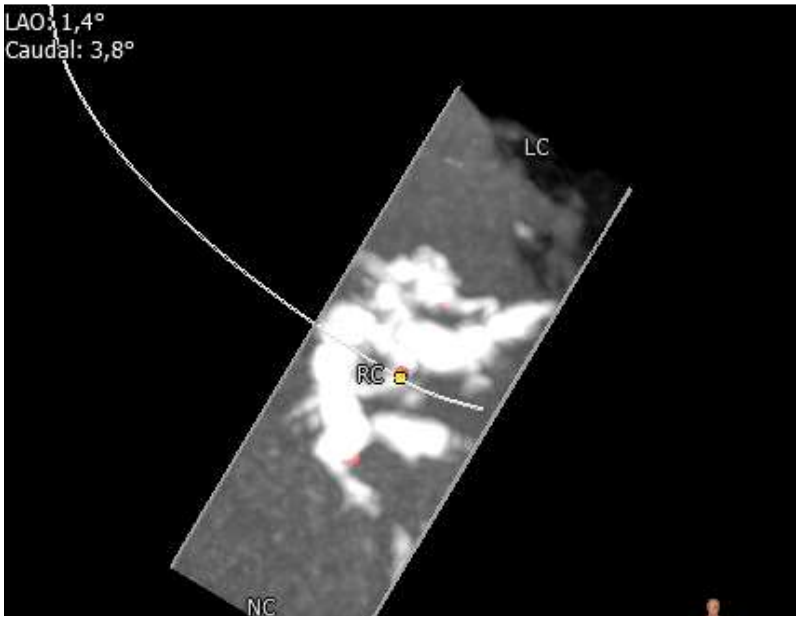
Heart Center Bonn
Medizinische Klinik und Poliklinik II
Universitätsklinikum Bonn
Email: jan-malte.sinning@ukbonn.de

Extremely calcified annulus

Perpendicular Plane (MPR)

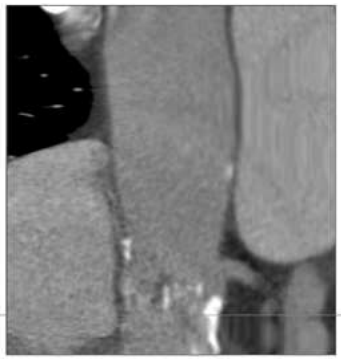


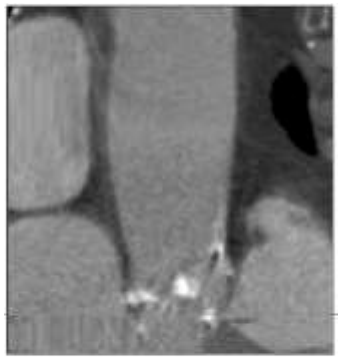
Hockey Puck (MIP, Phase 75%)



- Heavy calcification valve, annulus and LVOT
- Diameter 23 mm, perimeter 74 mm, area 420mm^3

ID	Type	Value	Label
1	Ellipse	419,6 mm^2	Area
		20,1 mm	Min. Ø
		26,6 mm	Max. Ø
		23,3 mm	Avg. Ø
		74,0 mm	Perimeter
		23,6 mm	Perimeter derived Ø
		23,1 mm	Area derived Ø





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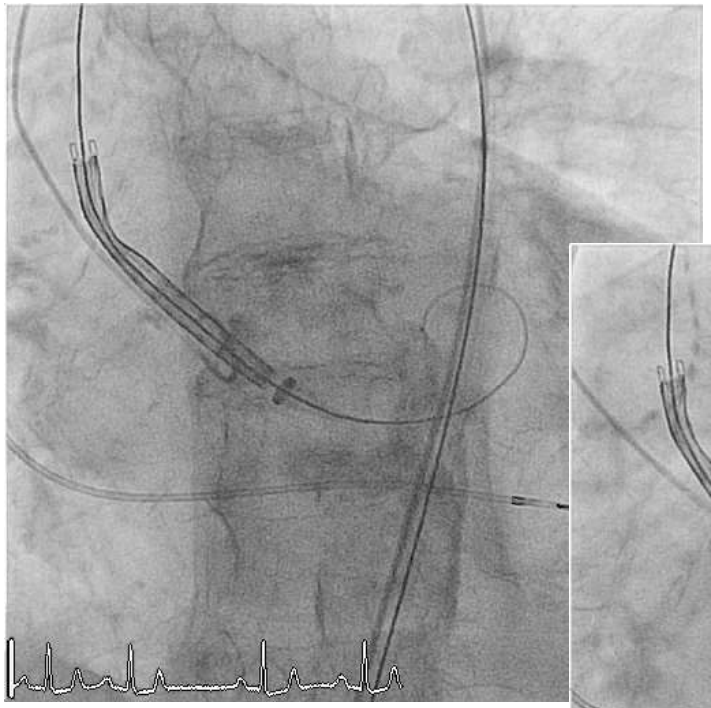

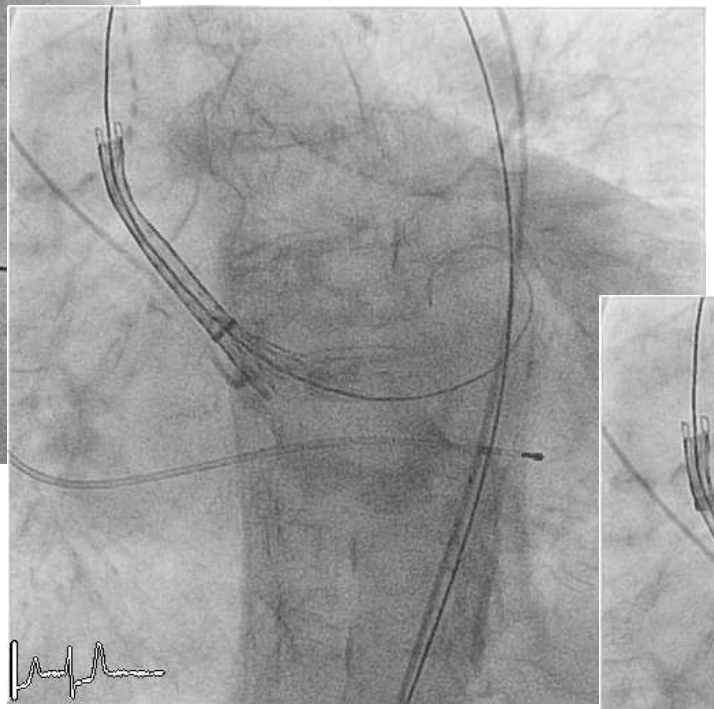

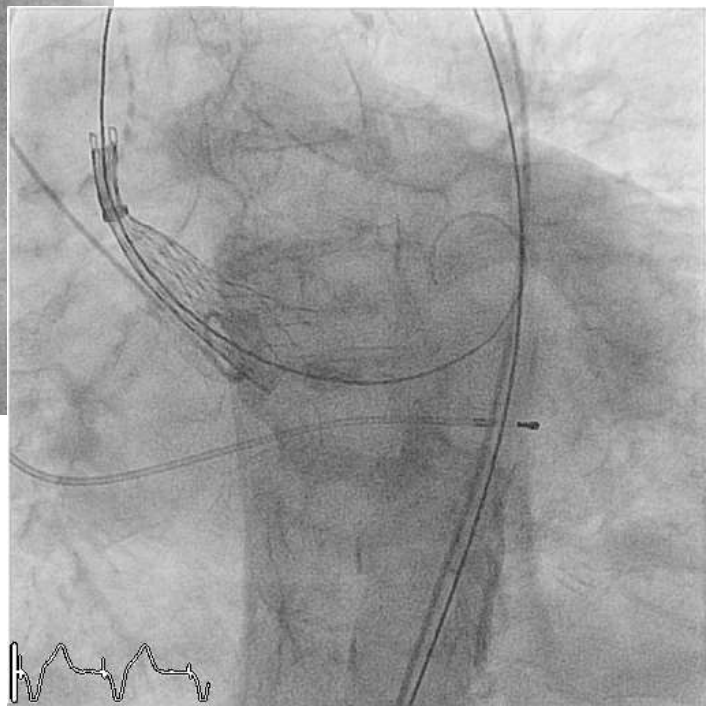

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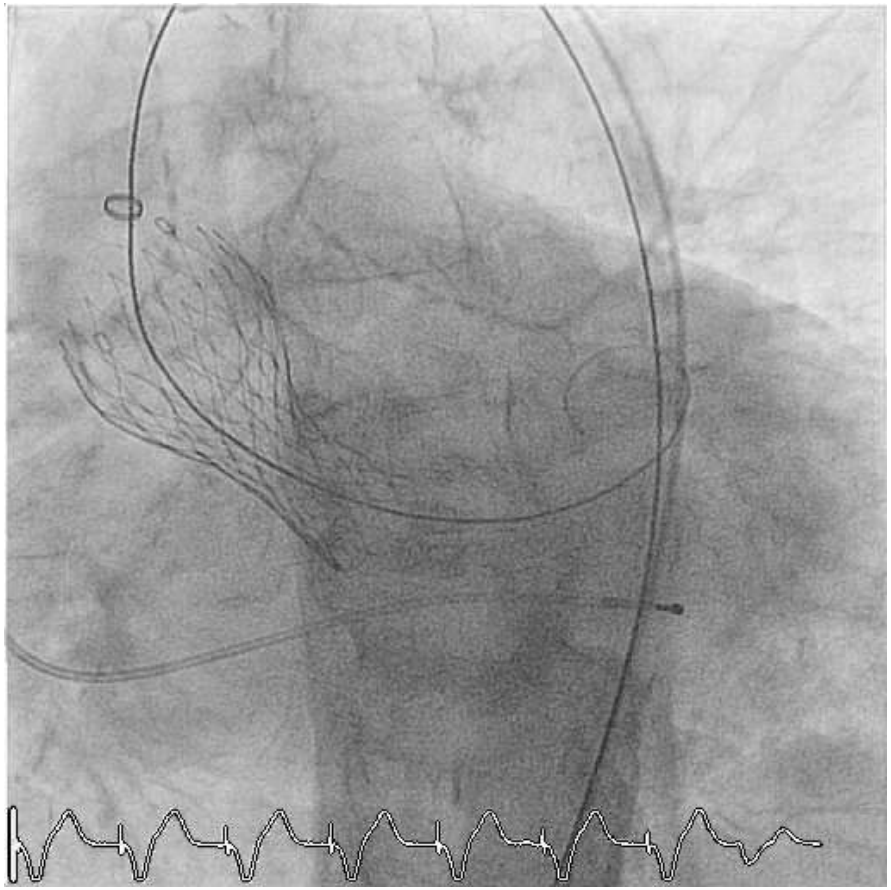

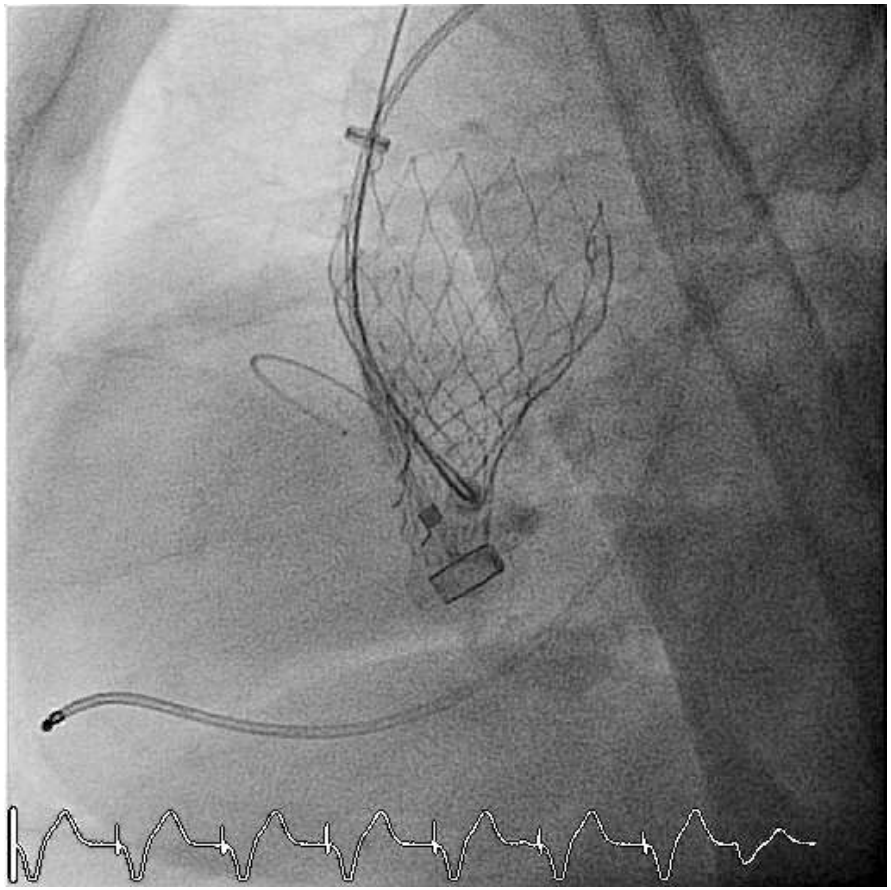

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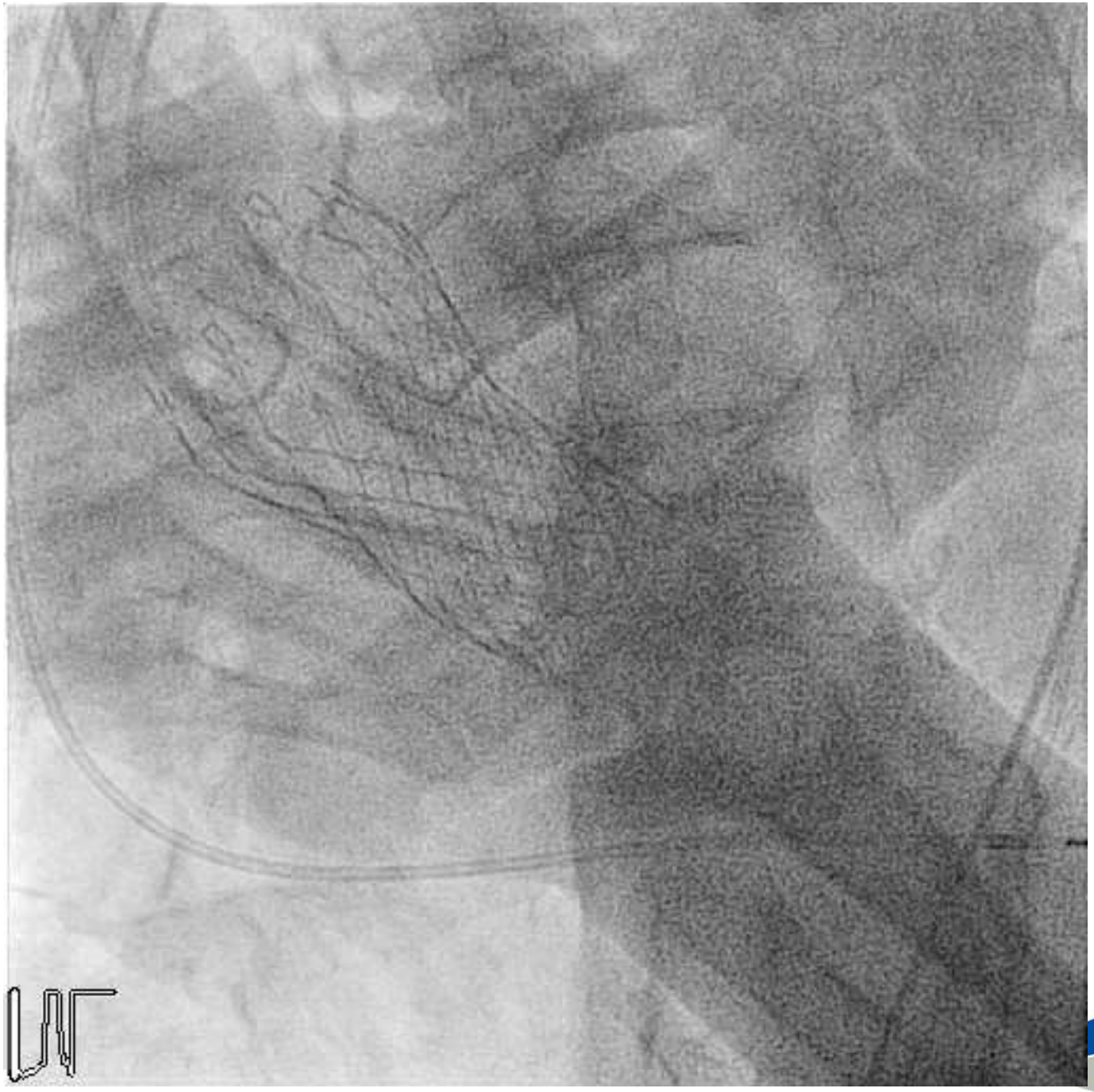

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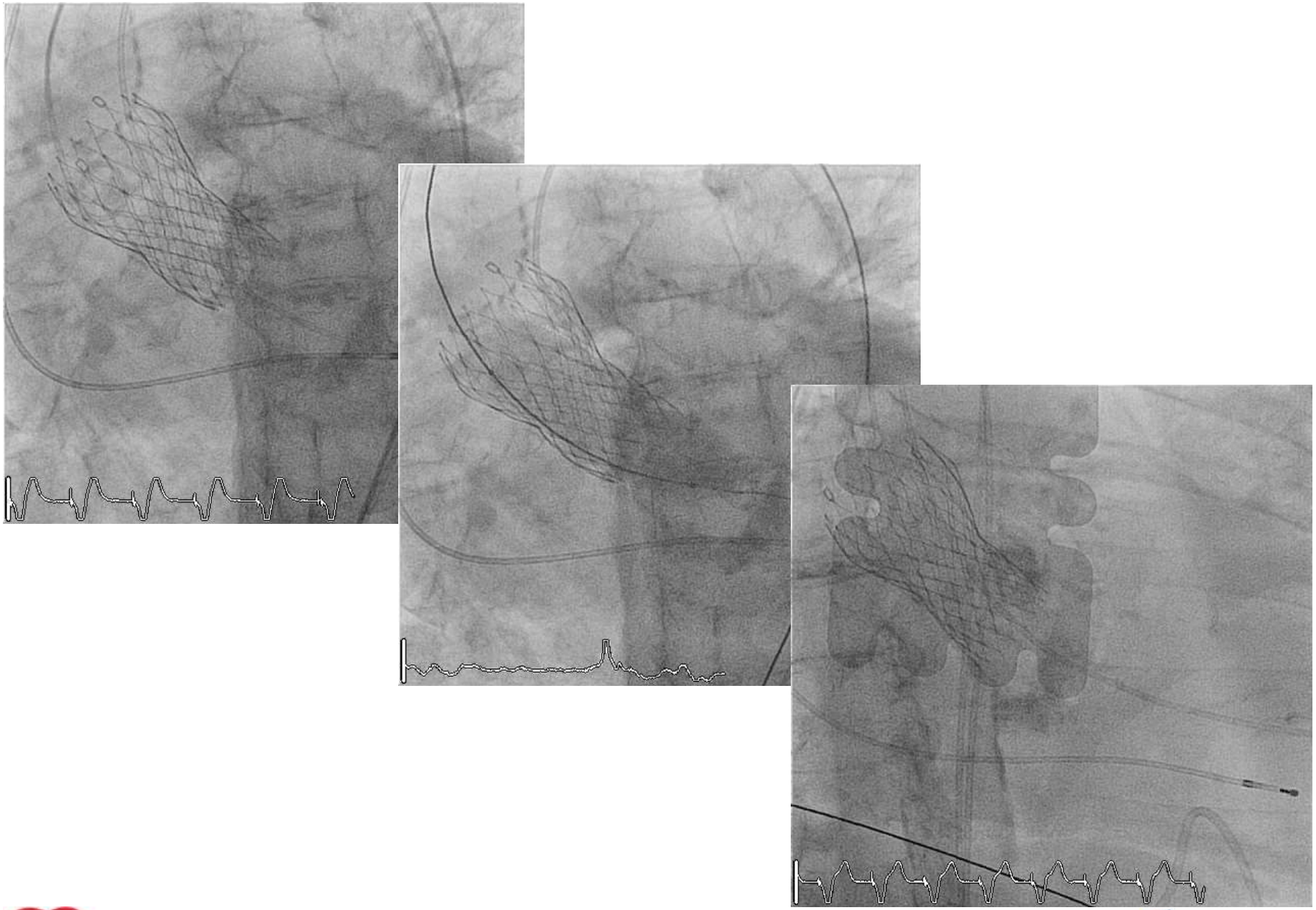

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