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# Patient and Device Selection for ViV TAVR: The Good, the Bad, and the Ugly

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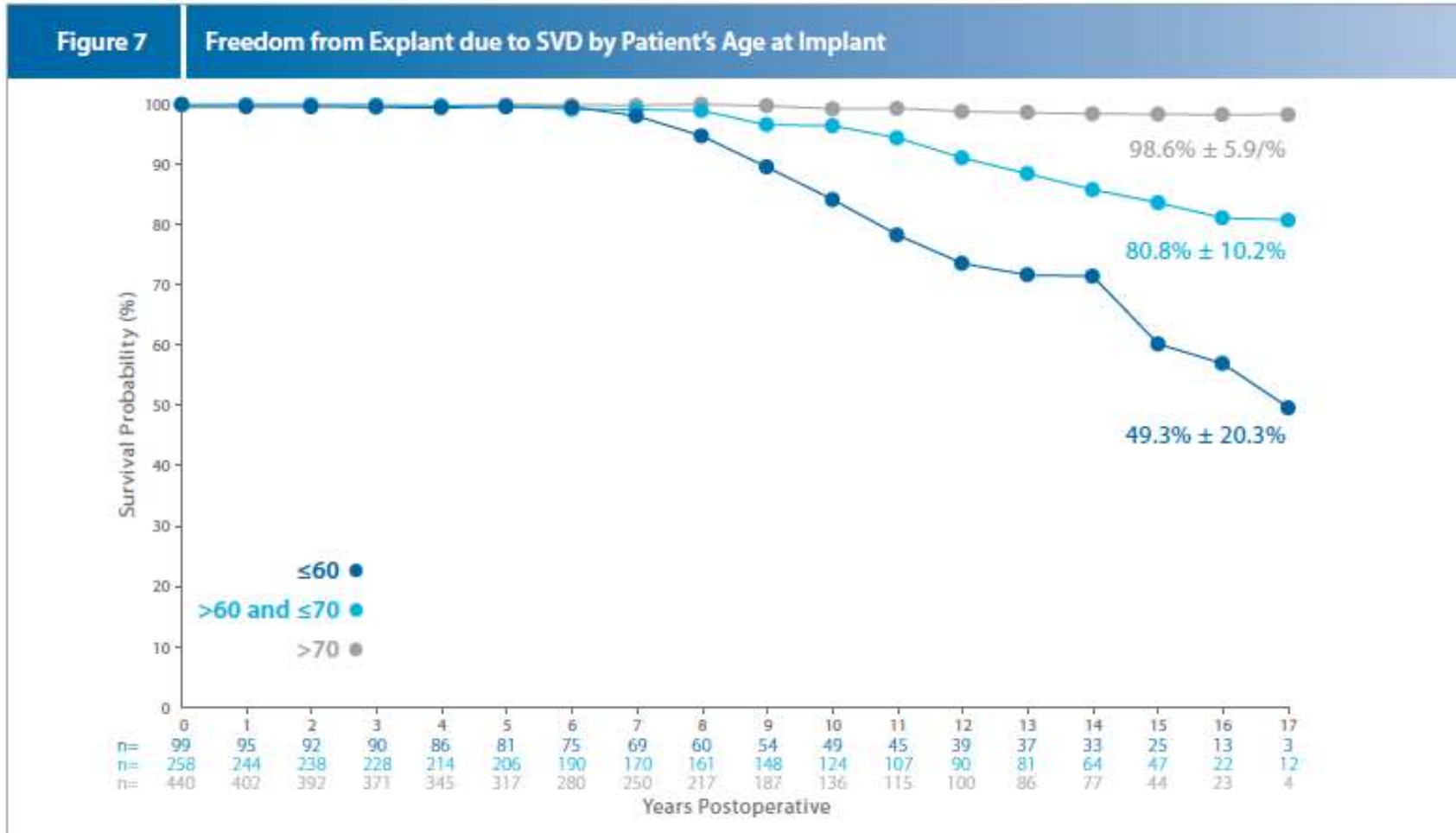
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Frankfurt, Germany

# Disclosures

Physician name	Company	Relationship
Horst Sievert	4tech Cardio, Abbott, Ablative Solutions, Ancora Heart, Bavaria Medizin Technologie GmbH, Bioventrix, Boston Scientific, Carag, Cardiac Dimensions, Celonova, Cibiem, CGuard, Comed B.V., Contego, CVRx, Edwards, Endologix, Hemoteq, InspireMD, Lifetech, Maquet Getinge Group, Medtronic, Mitralign, Nuomao Medtech, Occlutech, pfm Medical, Recor, Renal Guard, Rox Medical, Terumo, Vascular Dynamics, Vivasure Medical, Venus, Veryan	Consulting fees, Travel expenses, Study honoraria

# Bioprosthetic Aortic Valves do not function forever



- They may fail due to stenosis, insufficiency or a combination of both
- The risk of failure is higher in younger patients

# Patient selection for Valve in Valve



# Prosthetic Aortic Valve Failure

- For severely **symptomatic** patients with **bioprosthetic aortic valve stenosis or regurgitation** judged by the heart team to be at **high or prohibitive risk** for surgical therapy, in whom improvement in hemodynamics is anticipated, a **transcatheter valve-in-valve procedure is reasonable**

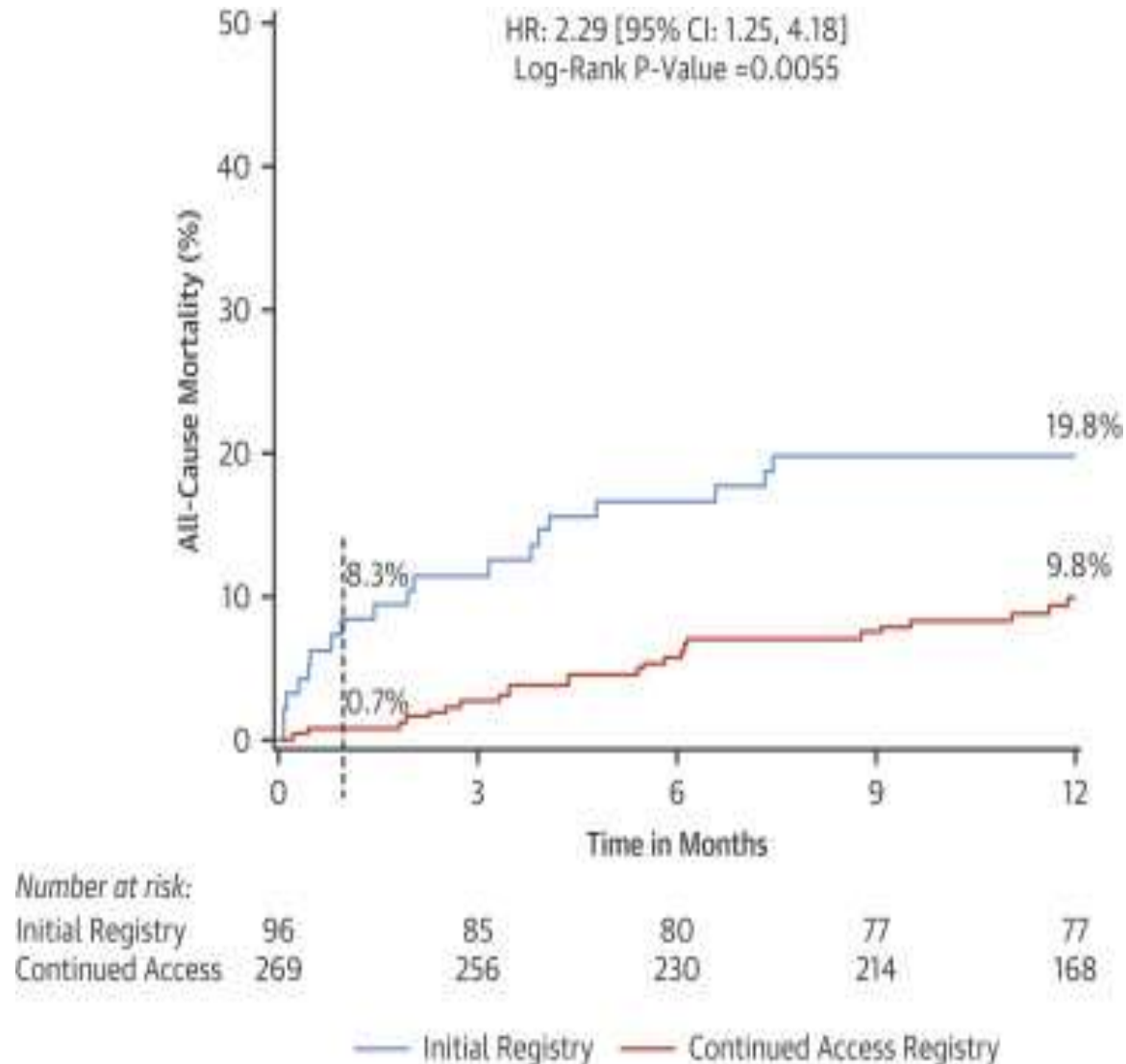
**Class IIa LOE B-NR**



Recommendations	Class	Level
<b>Bioprosthetic failure</b>		
Reoperation is recommended in symptomatic patients with a significant increase in transprosthetic gradient (after exclusion of valve thrombosis) or severe regurgitation.	<b>I</b>	<b>C</b>
Reoperation should be considered in asymptomatic patients with significant prosthetic dysfunction, if reoperation is at low-risk.	<b>IIa</b>	<b>C</b>
Transcatheter valve-in-valve implantation in aortic position should be considered by the Heart Team depending on the risk of reoperation and the type and size of prosthesis.	<b>IIa</b>	<b>C</b>

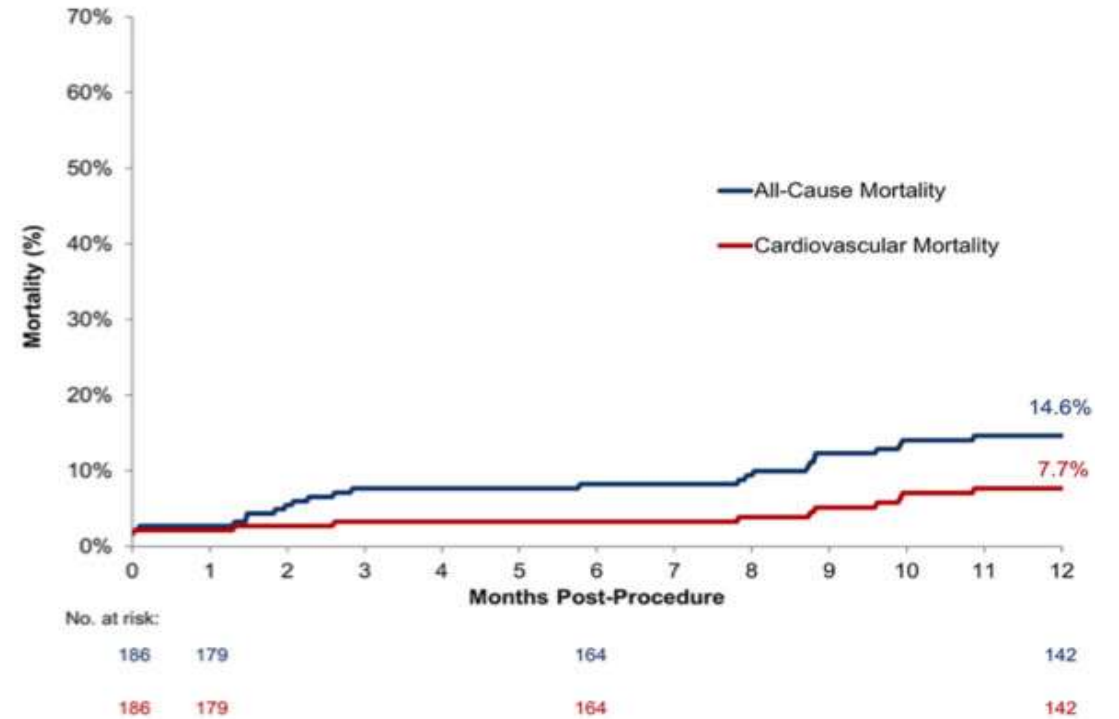
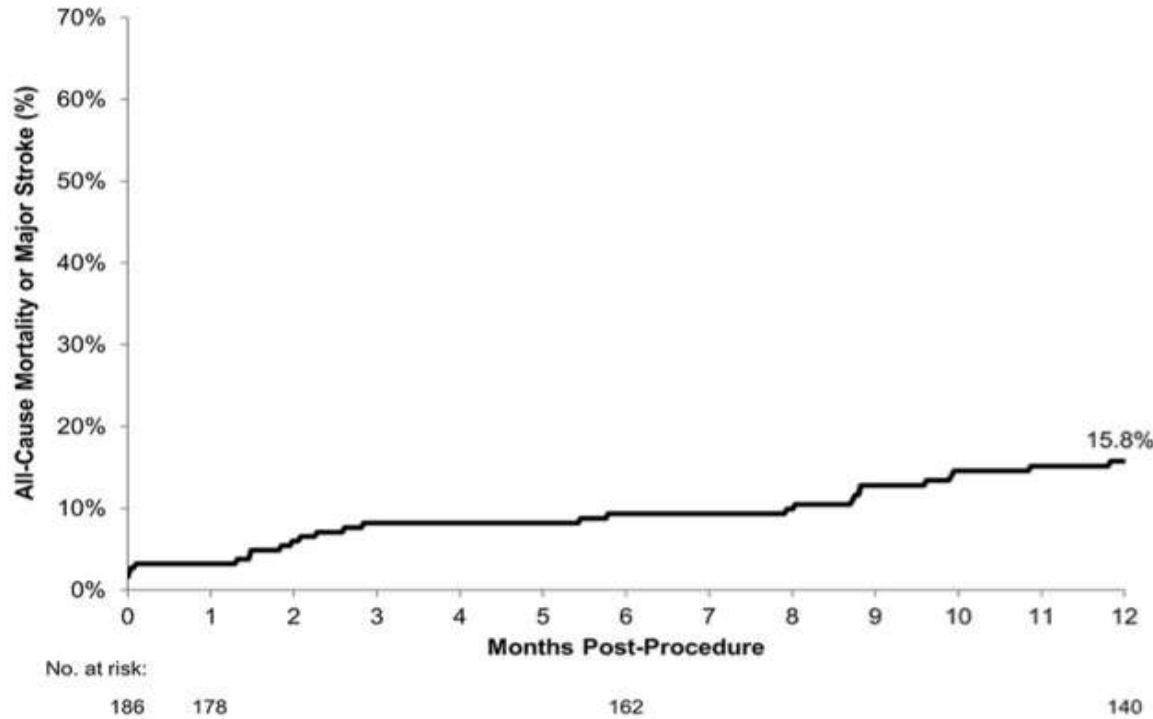


# TAVI for Bioprosthetic Stenosis/Regurgitation



- Failed SAVR (n=365)
  - Initial Registry (n=96)
  - Continued Access (n=269)
  - Mean age: 78.9
  - Mean STS score: 9.1%
  - Device Type: Sapien XT
- Surgical implant >10yr: 66.3%
- All-cause mortality
  - 30 days: 2.7%
  - 1 year: 12.4%
- Major stroke:
  - 30 days: 2.7%
  - 1 year: 4.5%
- New PPM at 30-days: 1.9%

# TAVI for Bioprosthetic Stenosis/Regurgitation



- N=233
- Mean age: 76.7 yr
- Mean STS: 9.0 ± 6.7%
- Surgical implant >10yr: 55.9%
- CoreValve U.S Study

- All-cause mortality
  - 30 days: 2.2%
  - 1 year: 14.6%
- Major stroke:
  - 30 days: 0.4%
  - 1 year: 1.8%
- PPM rate:
  - 30 days: 8.1%
  - 1 year: 11.0%



# Surgical Valves

## A. Stented

Perimount  
(Edwards Lifesciences)



Epic  
(St. Jude Medical)



Hancock II  
(Medtronic)



## B. Stented, Supraannular position

Magna  
(Edwards Lifesciences)



Mosaic  
(Medtronic)



## C. Stented, Externally Mounted Leaflets

Mitroflow  
(Sorin)



Trifecta  
(St. Jude Medical)



## D. Stentless

Freedom  
(Sorin)



Toronto SPV  
(St. Jude Medical)



Freestyle  
(Medtronic)



# Mechanism of valve failure

Stenosis

Pannus



Thrombus



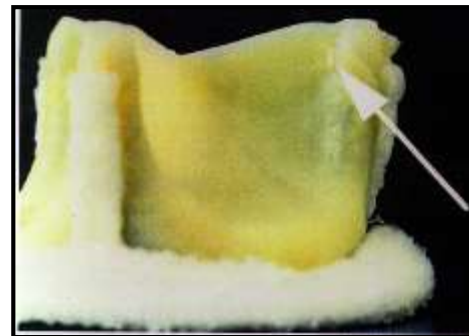
Calcification



Wear & Tear (int.)



Wear & Tear (ext.)

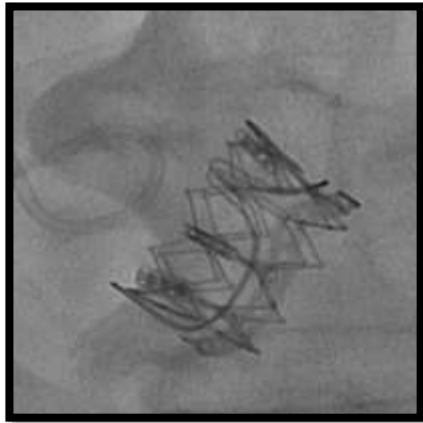


Endocarditis

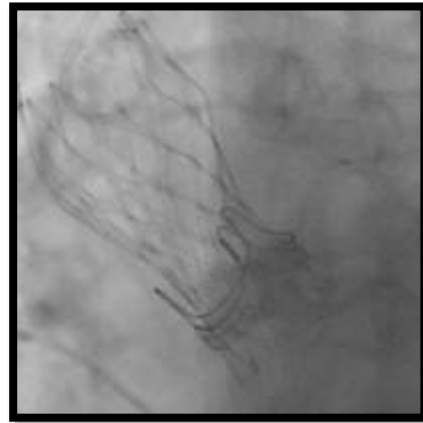


Regurgitation

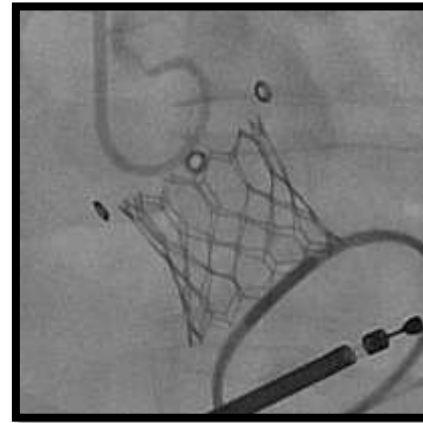
# Which TAVI valves have been used for ViV ?



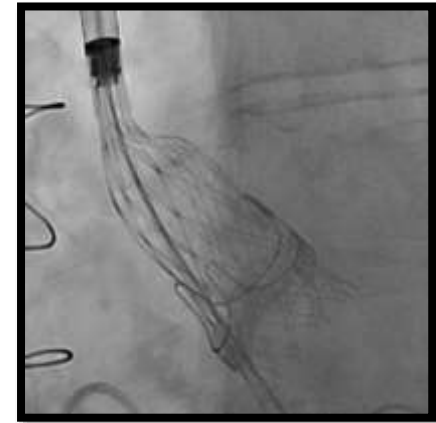
**SAPIEN XT**



**CoreValve**



**SAPIEN 3**

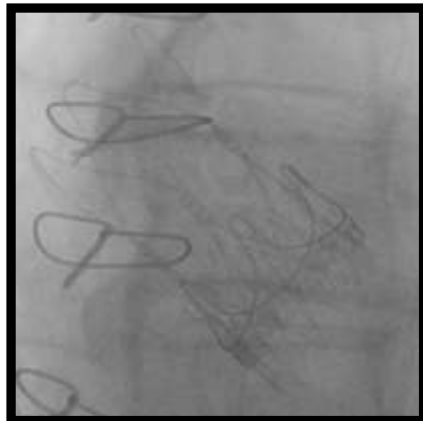


**Evolut R**

**Engager**



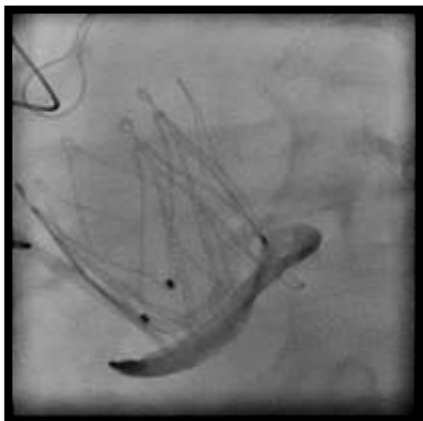
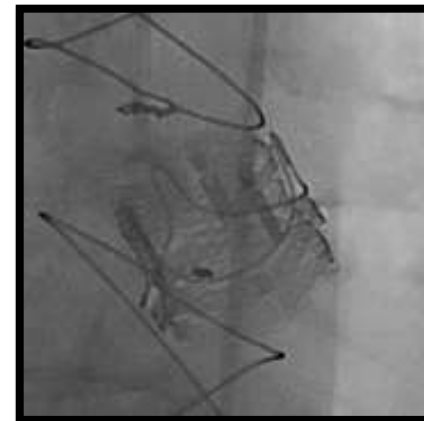
**Symetis**



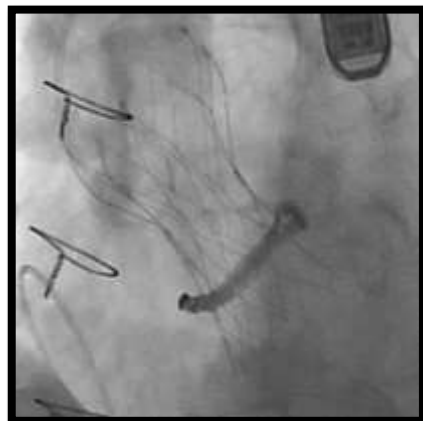
**DirectFlow**



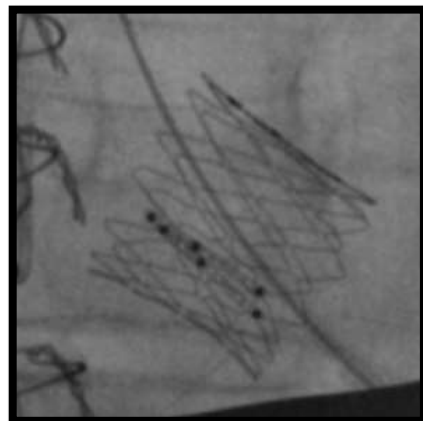
**Lotus**



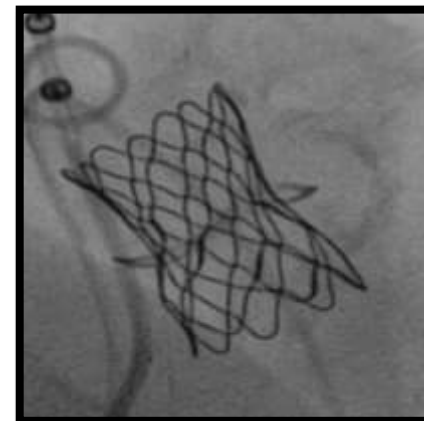
**Jena**



**Portico**



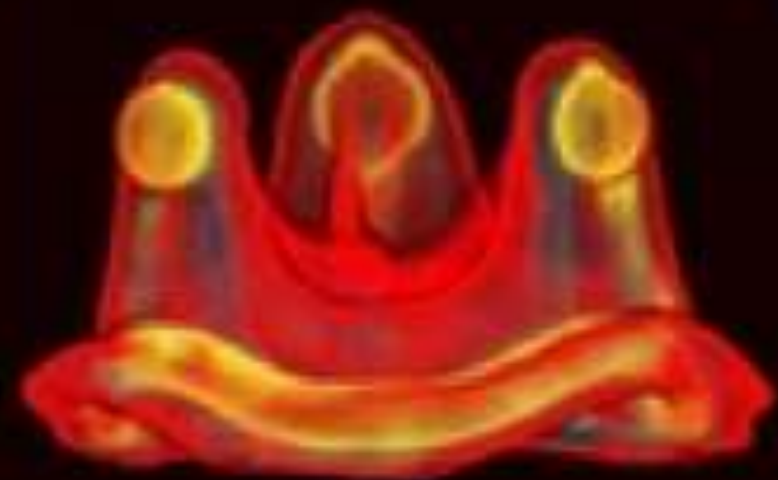
**Inovare**



**Melody**

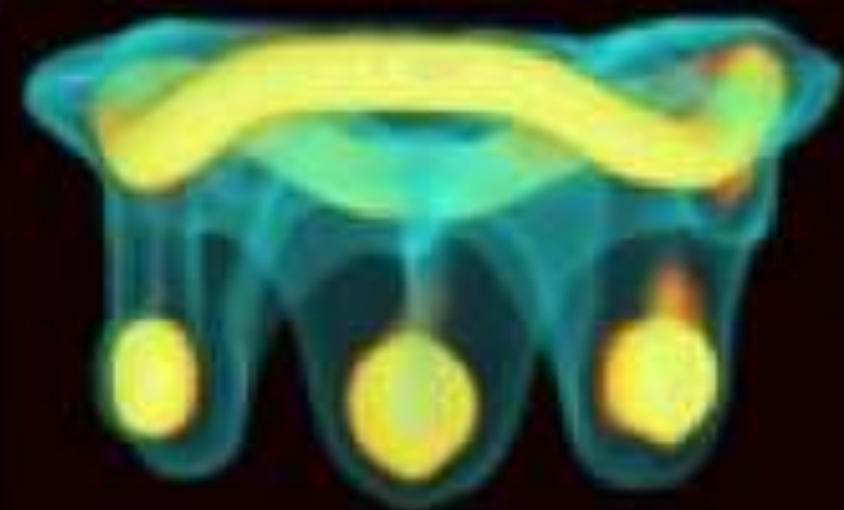
# Valve selection and sizing

- Check type and the inner diameter of the surgical valve
  - OR reports and IFU or information from the manufacturer
- Use CT scan!
  - Inner diameter may be smaller due to leaflet thickening and calcification
  - Distance to the coronary arteries
- Use the ViV App!



**aortic**

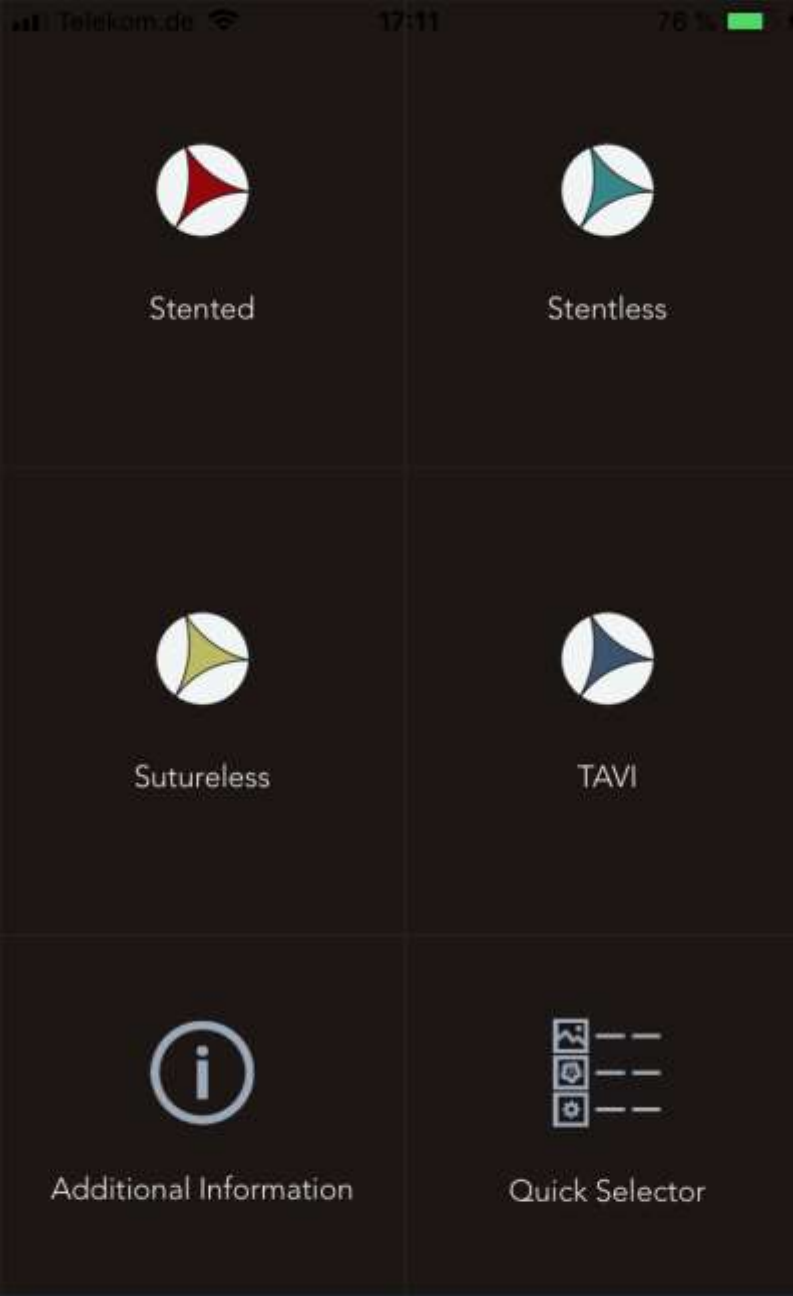
ViV Aortic



**mitral**

ViV Mitral





Stented



Stentless



Sutureless



TAVI



Additional Information



Quick Selector

About

Disclaimer

Stented
< Stented
Hancock II

Stented	Hancock II
Aspire 5 >	<p><b>Details</b></p> <p>Medtronic inc Porcine leaflets Leaflets sutured inside the stent</p>
Biocor / Epic 5 >	
Biocor / Epic Supra 5 >	<p><b>Fluoroscopic Part</b></p> <p>Fluoroscopic Markers - Sewing ring and stent post tip &gt;</p>
CE SAV 7 >	<p><i>Double tap image for fullscreen</i></p>
CE Standard 7 >	<p><i>Image scrolls horizontally</i></p>
Dokimos 5 >	
Hancock II 5 >	
Intact 6 >	
Labcor Porcine 6 >	
Magna 6 >	


Sizes

21
23
25





**Details**  
 Medtronic inc  
 Porcine leaflets  
 Leaflets sutured inside the stent

 **Fluoroscopic Part**  
 Fluoroscopic Markers - Sewing ring and stent post tip >

*Double tap image for fullscreen* ↗



← *Image scrolls horizontally* →

Sizes Sizes Sizes

21 23 25 21 23 25 21 23 25

Hancock II

Medtronic inc  
Porcine leaflets  
Leaflets sutured inside the stent

**Fluoroscopic Part**  
Fluoroscopic Markers - Sewing ring and stent post tip

Double tap image for fullscreen

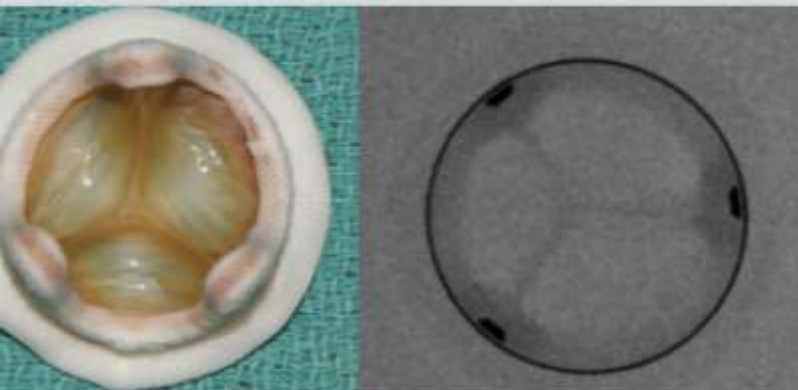
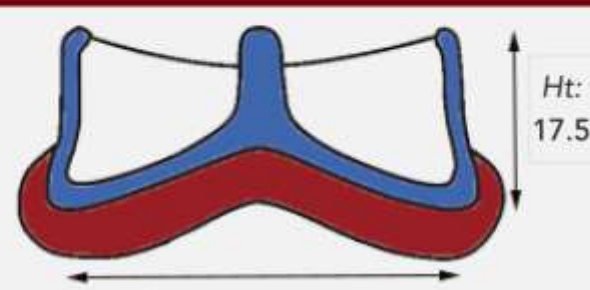


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Sizes



Hancock II, 25



True ID 20.5



Hancock II

**CoreValve Ideal Placement**  
If recommendation is two sizes, choose the valves size depending on size of sinus of valsalva. Place CoreValve 4mm below the fluoroscopic marker in the sewing ring

Double tap image for fullscreen

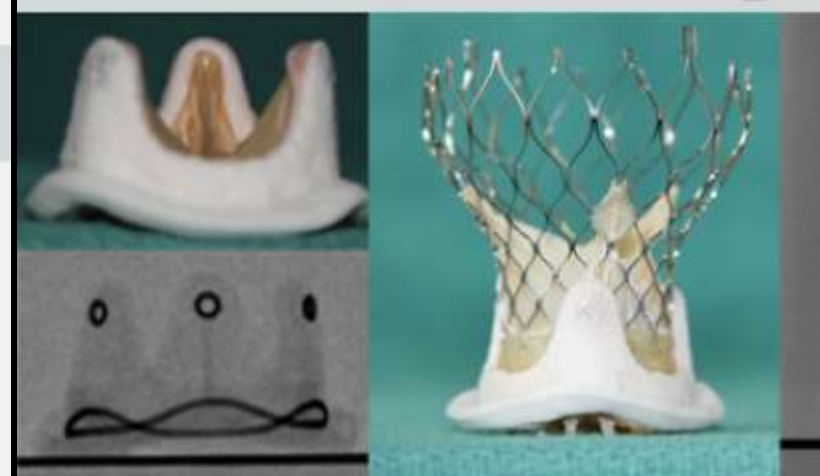


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Video Guidance

Play Video

## < TAVI Choices CoreValve Ideal Placement

### Hancock II

#### CoreValve Ideal Placement

If recommendation is two sizes, choose the valves size depending on size of sinus of valsalva. Place CoreValve 4mm below the fluoroscopic marker in the sewing ring

Double tap image for fullscreen

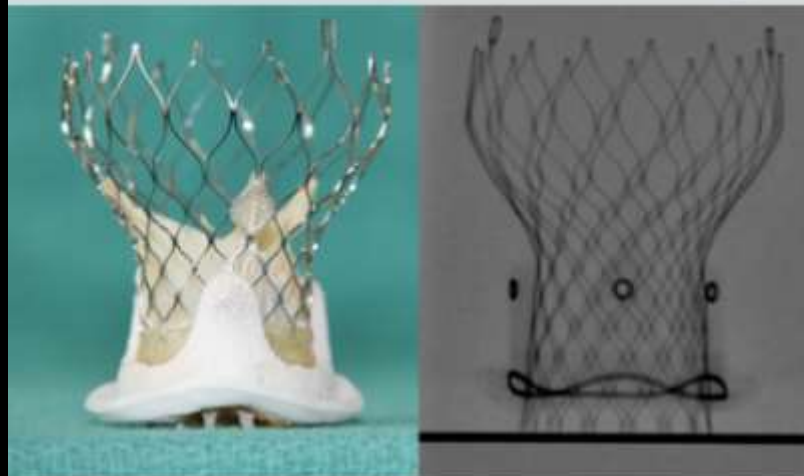


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### Video Guidance

Play Video



Home



Stented



Stentless



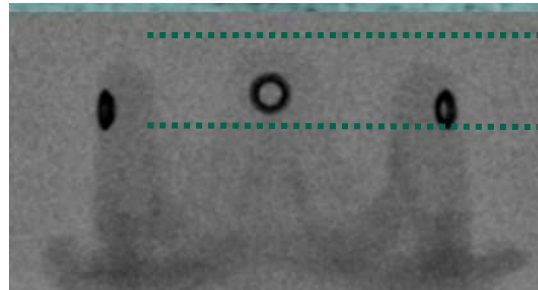
Sutureless



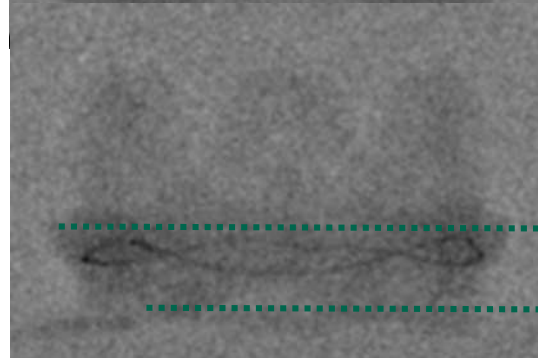
TAVI

# Valve-in-Valve Positioning Considerations

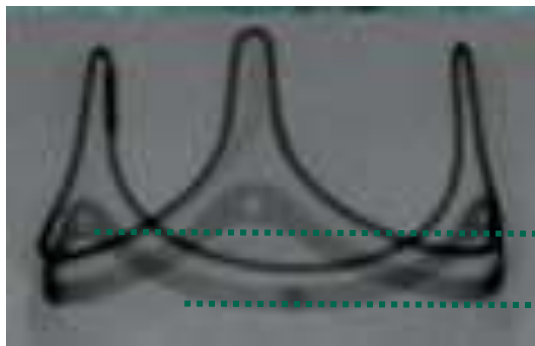
Location of Angiographic Markers in Surgical Valves Varies



Markers located in crown



Markers located above inflow edge



Markers located at inflow edge





# What are the challenges?

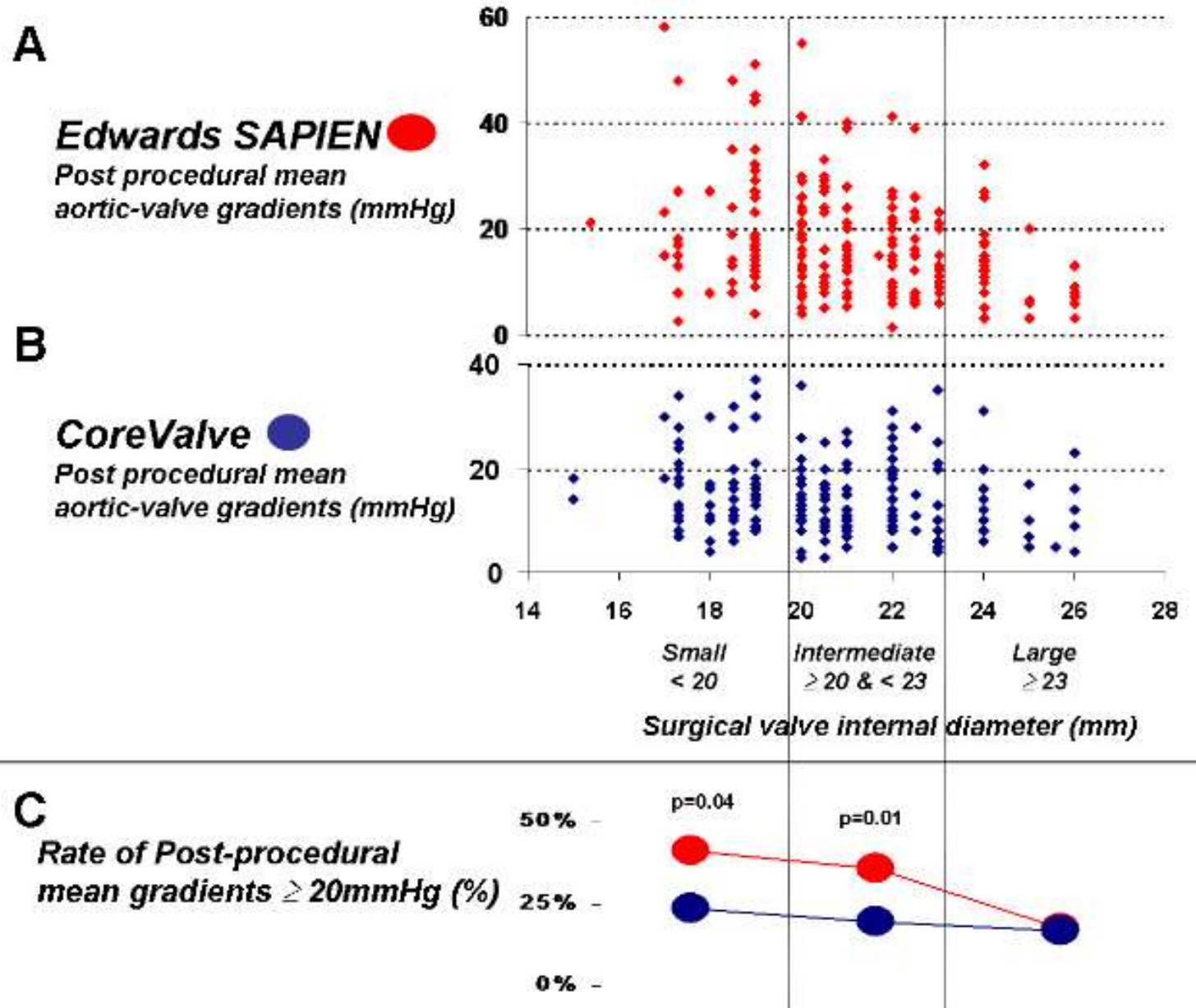
- Make sure there is no paravalvular (surgical) leak
- Crossing the bioprosthetic valve may be more difficult
- Introducing the TAVI valve into a bioprosthesis may be more difficult
- Positioning may be very difficult in stentless valves with severe regurgitation
- Higher stroke risk
- Patient – prosthesis mismatch of the surgical valve
- High residual gradient
- Higher risk of coronary obstruction with some of the surgical valves

# Are there any good news?

- Sizing is easier
- Positioning the valve is very easy – in stented valves
- No paravalvular leaks
- Lower risk of need for permanent pacemaker
- No risk of anulus rupture

Residual stenosis due to initial patient prosthesis mismatch + the additional material of the TAVI valve

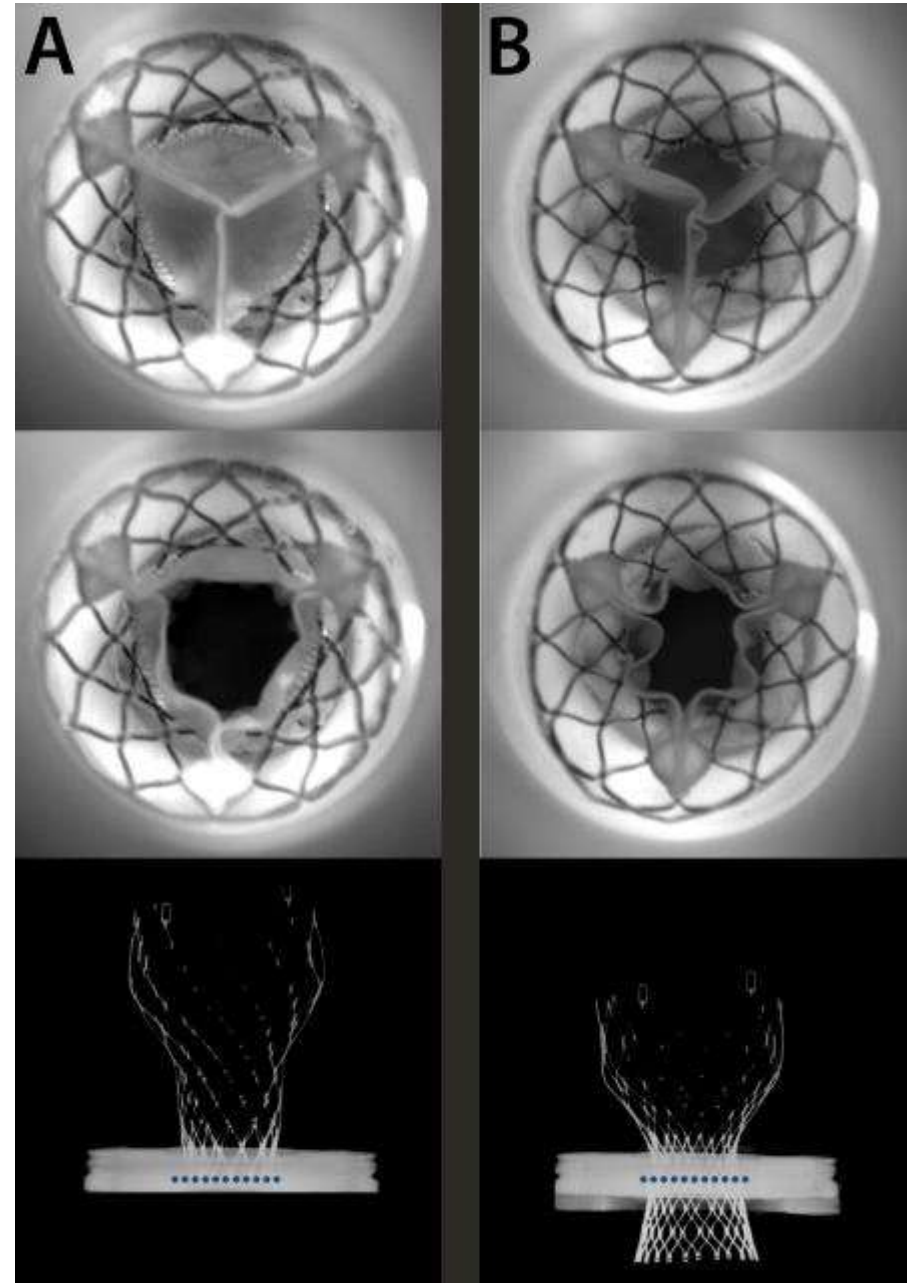
Supra-anular valve design (CoreValve) may be better than intra-anular design (Sapien, Portico)





Position of the valve is important

Smaller valve area and higher gradient if the CoreValve is placed too low



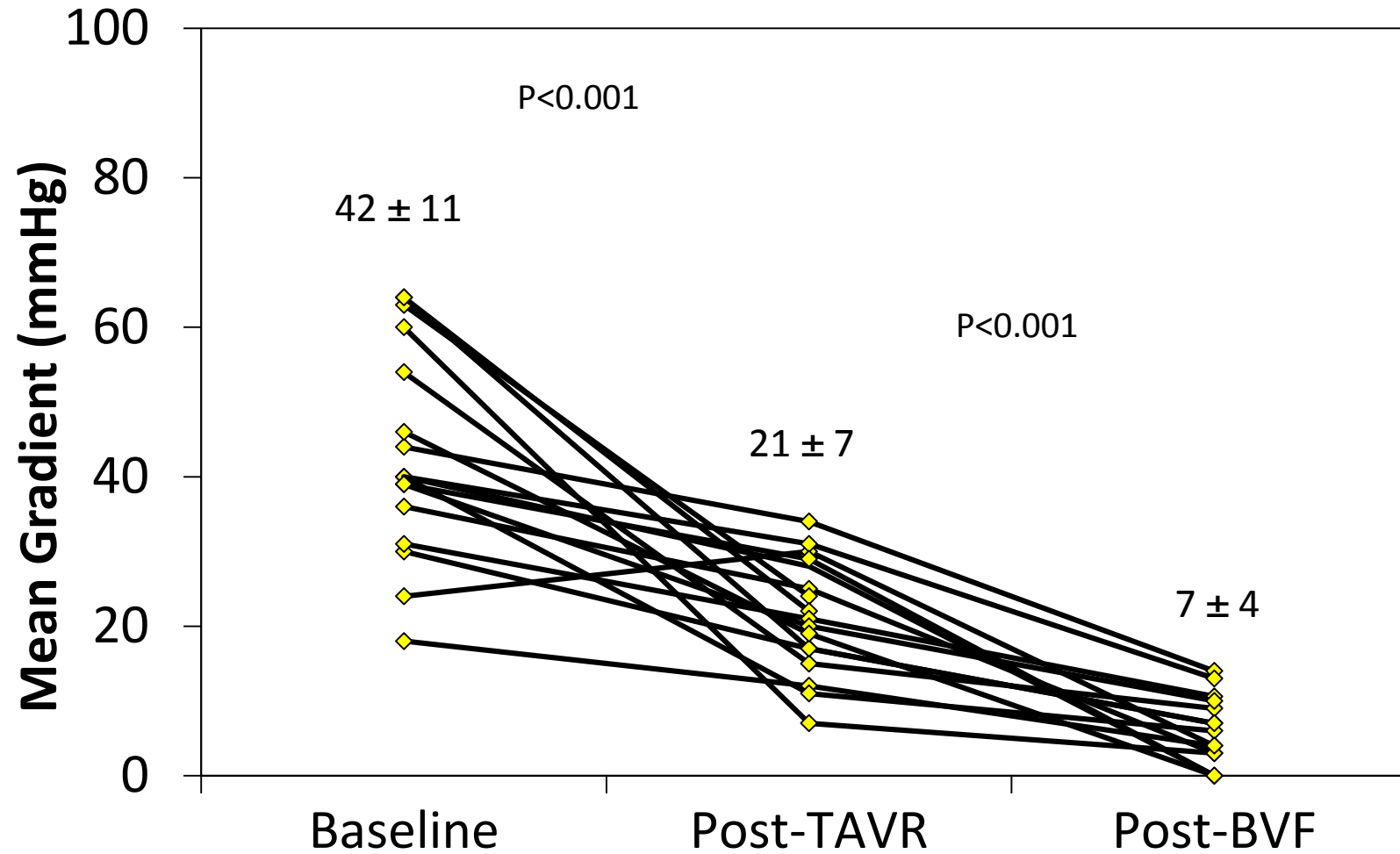
# If there is a residual gradient:

- Post – dilate!
  - it leads to compression of the bioprosthesis leaflets which may add 1mm
- Consider bioprosthetic valve ring fracture (BVF)

# Bioprosthetic Valve Ring Fracture (BVF)



# Bioprosthetic Valve Ring Fracture



# Complications of Bioprosthetic Valve Ring Fracture

- N = 74 (21 centers)
  - 2 embolic stroke
  - 1 flail anterior MV leaflet –required surgery
  - 2 severe AI from TAVR valve – treated with 2nd valve
- Potential complications
  - Aortic root or annulus rupture
  - Coronary occlusion
  - AV block

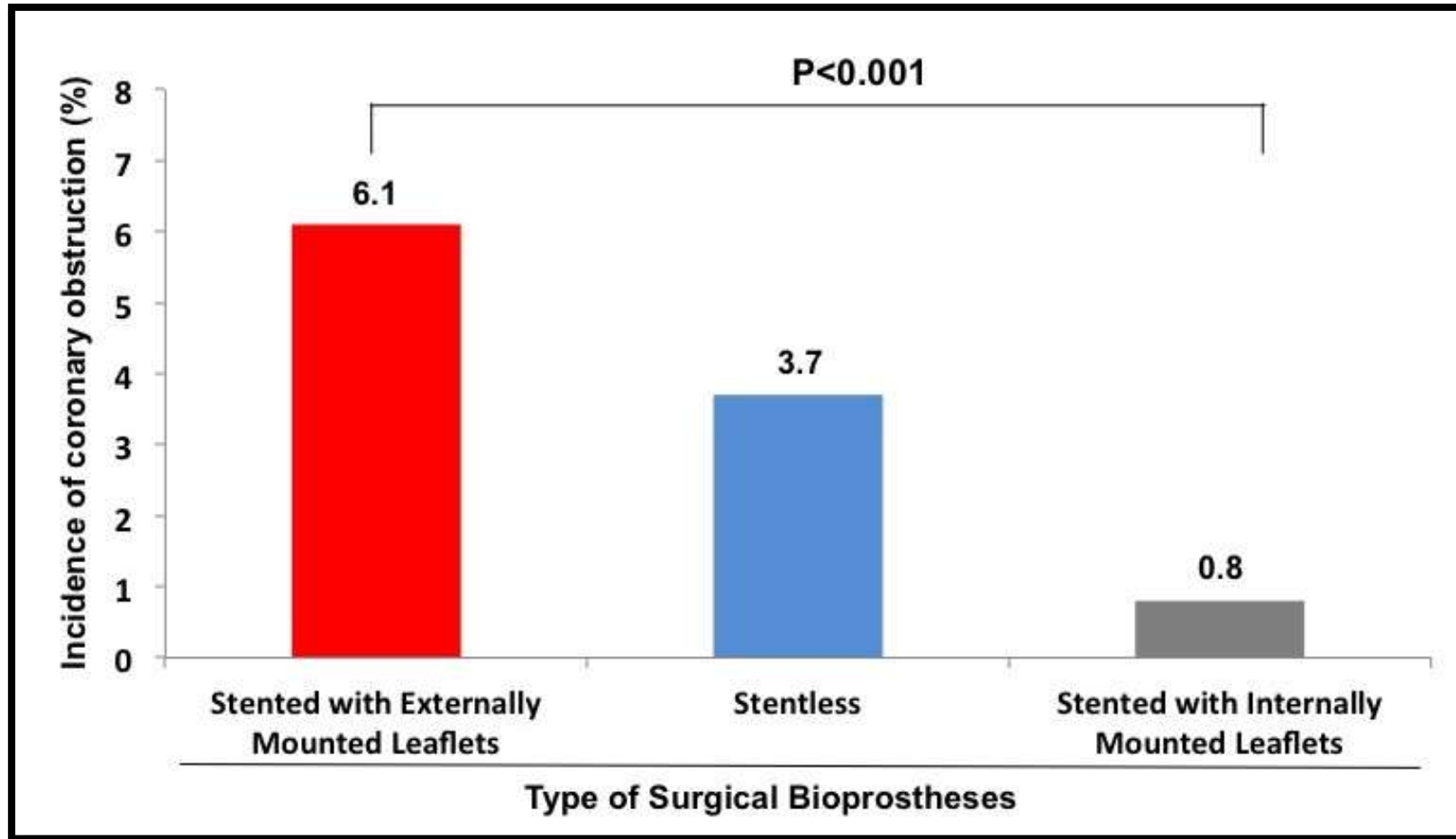
# Not all surgical valves can be fractured!

Manufacturer/ Brand	Valve Size	Bard TRU Balloon Fracture/Pressure	Bard Atlas Gold Balloon Fracture/Pressure	Appearance After Fracture
<b>St. Jude Trifecta</b> 	19 mm	NO	NO	
	21 mm	NO	NO	
<b>St. Jude Biocor Epic</b> 	21 mm	YES / 8 ATM	YES / 8 ATM	
<b>Medtronic Mosaic</b> 	19 mm	YES / 10 ATM	YES / 10 ATM	
	21 mm	YES / 10 ATM	YES / 10 ATM	
<b>Medtronic Hancock II</b> 	21 mm	NO	NO	
<b>Sorin Mitroflow</b> 	19 mm	YES / 12 ATM	YES / 12 ATM	
	21 mm	YES / 12 ATM	YES / 12 ATM	
<b>Edwards MagnaEase</b> 	19 mm	YES / 18 ATM	YES / 18 ATM	
	21 mm	YES / 18 ATM	YES / 18 ATM	
<b>Edwards Magna</b> 	19 mm	YES / 24 ATM	YES / 24 ATM	
	21 mm	YES / 24 ATM	YES / 24 ATM	

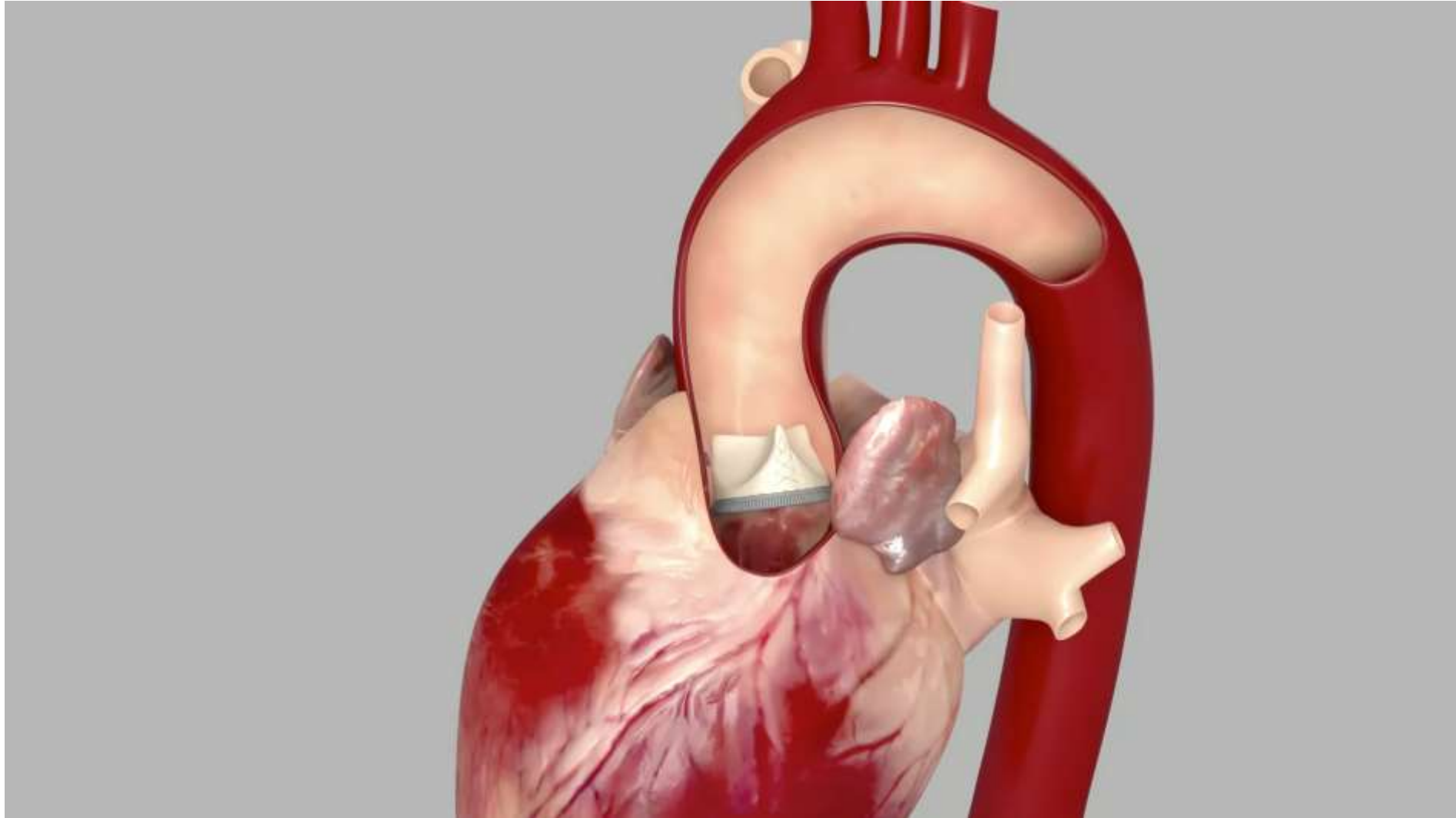
# Coronary obstruction



# Incidence of Coronary Obstruction According to the Type of Surgical Bioprosthesis

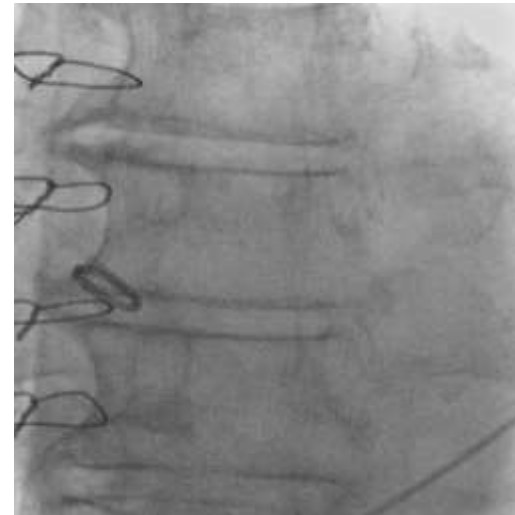
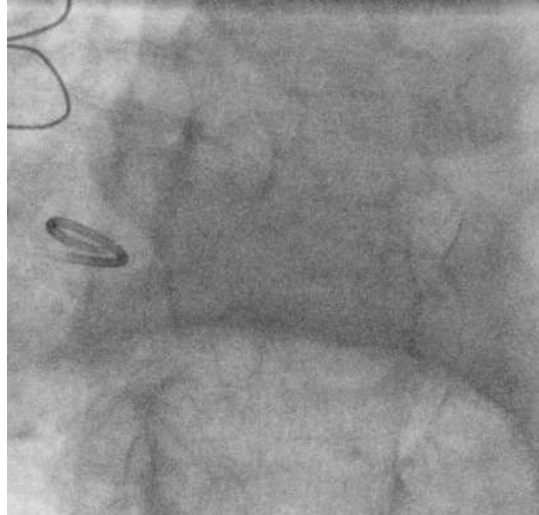
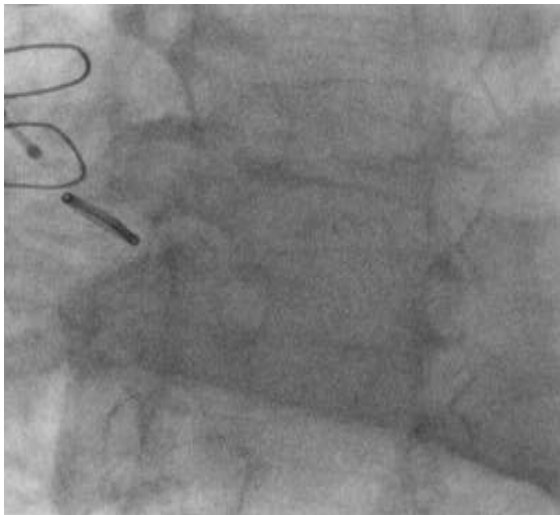
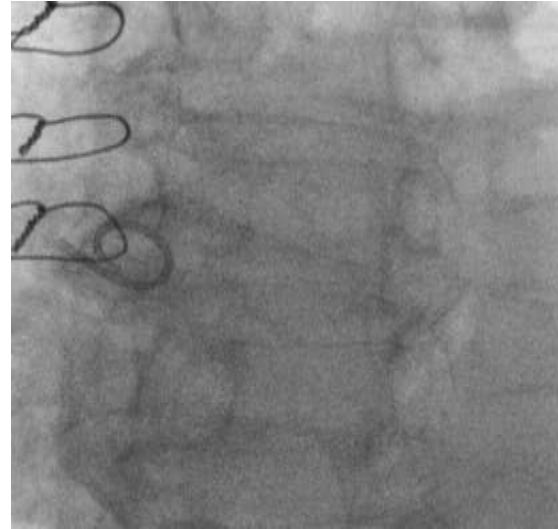
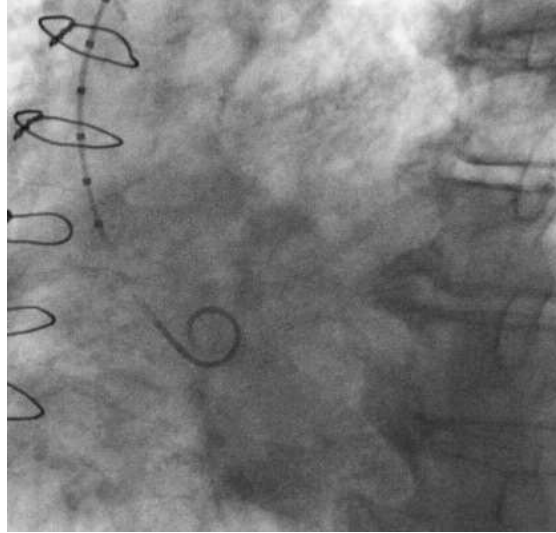


# BASILICA



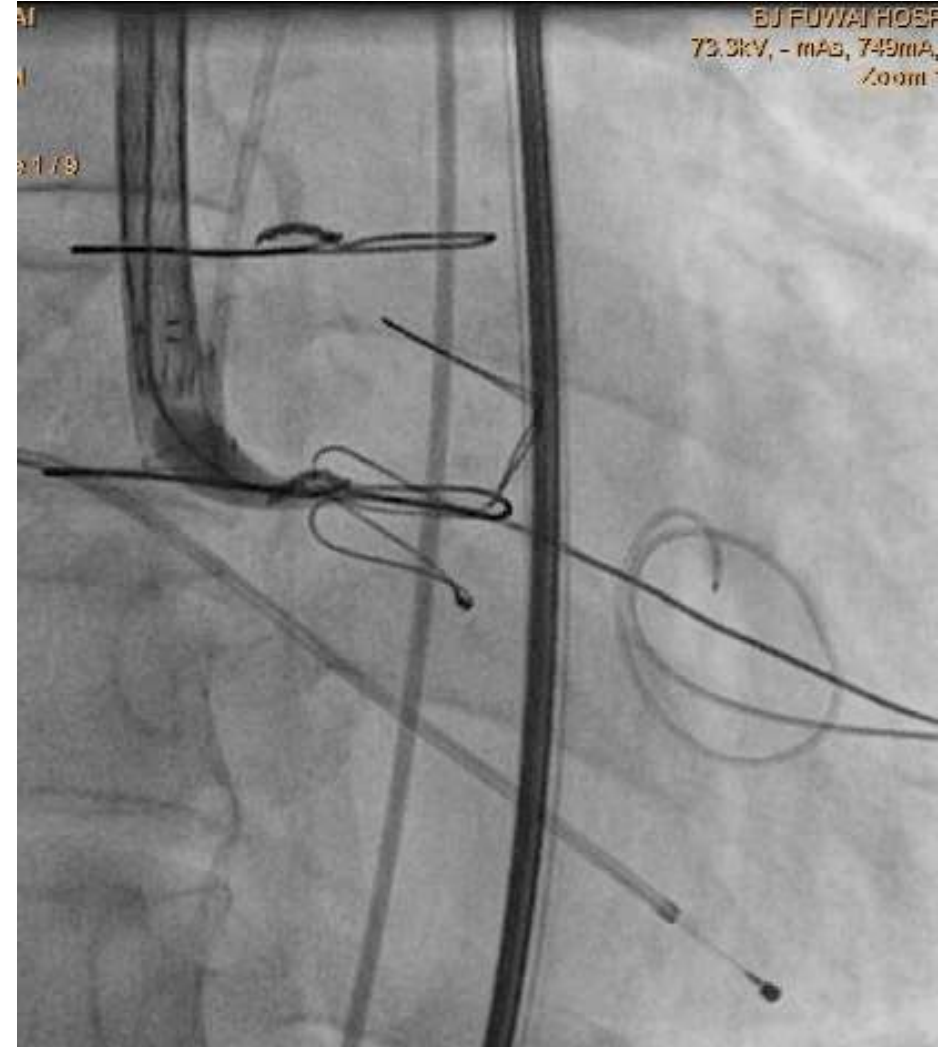
Other problems

Some valves (like Labcor) are not well visible on fluoro

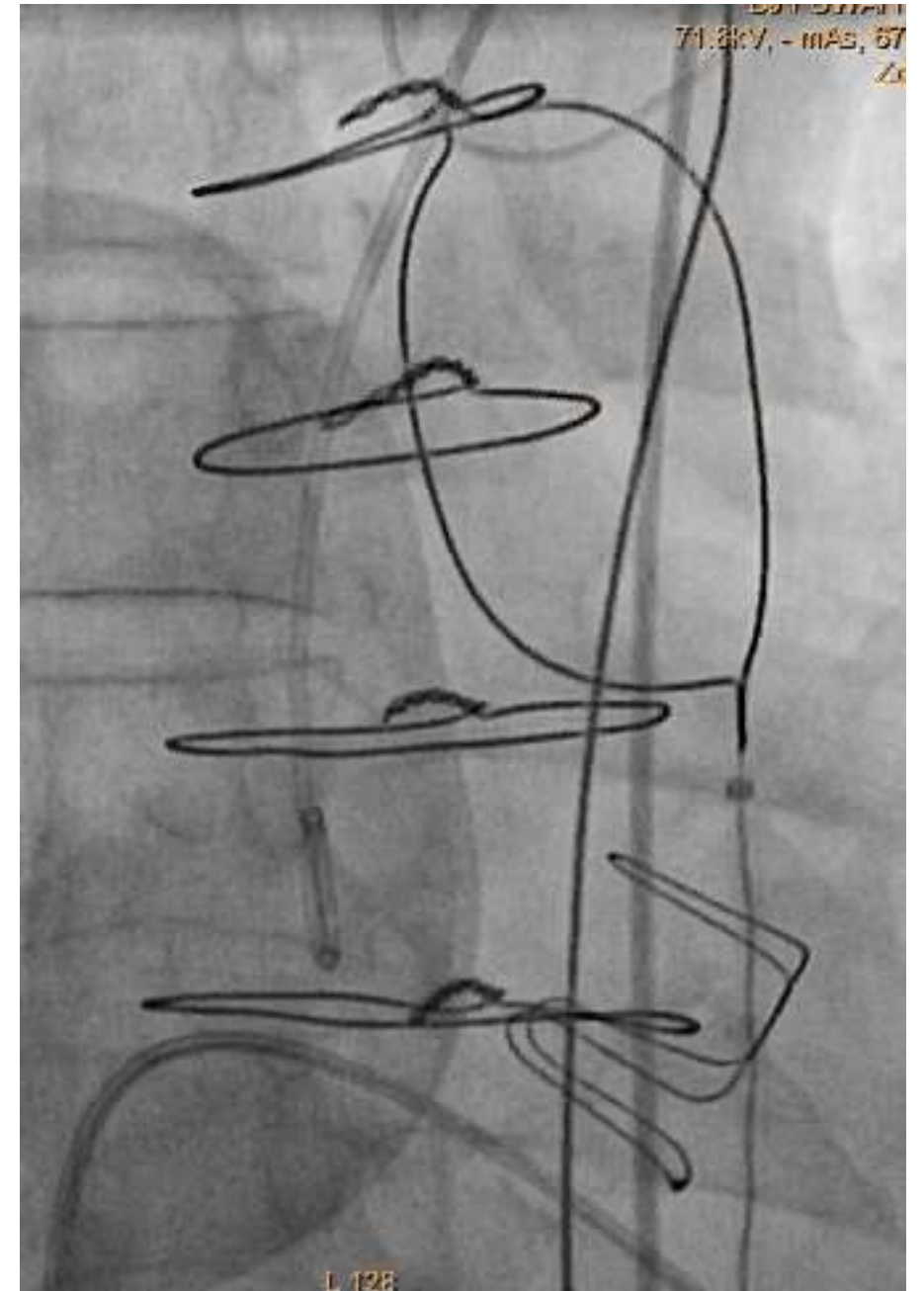


# Difficulties to cross

- Degenerated bioprosthetic valve
- Horizontal aorta
- Venus valve could not be introduced into the LV

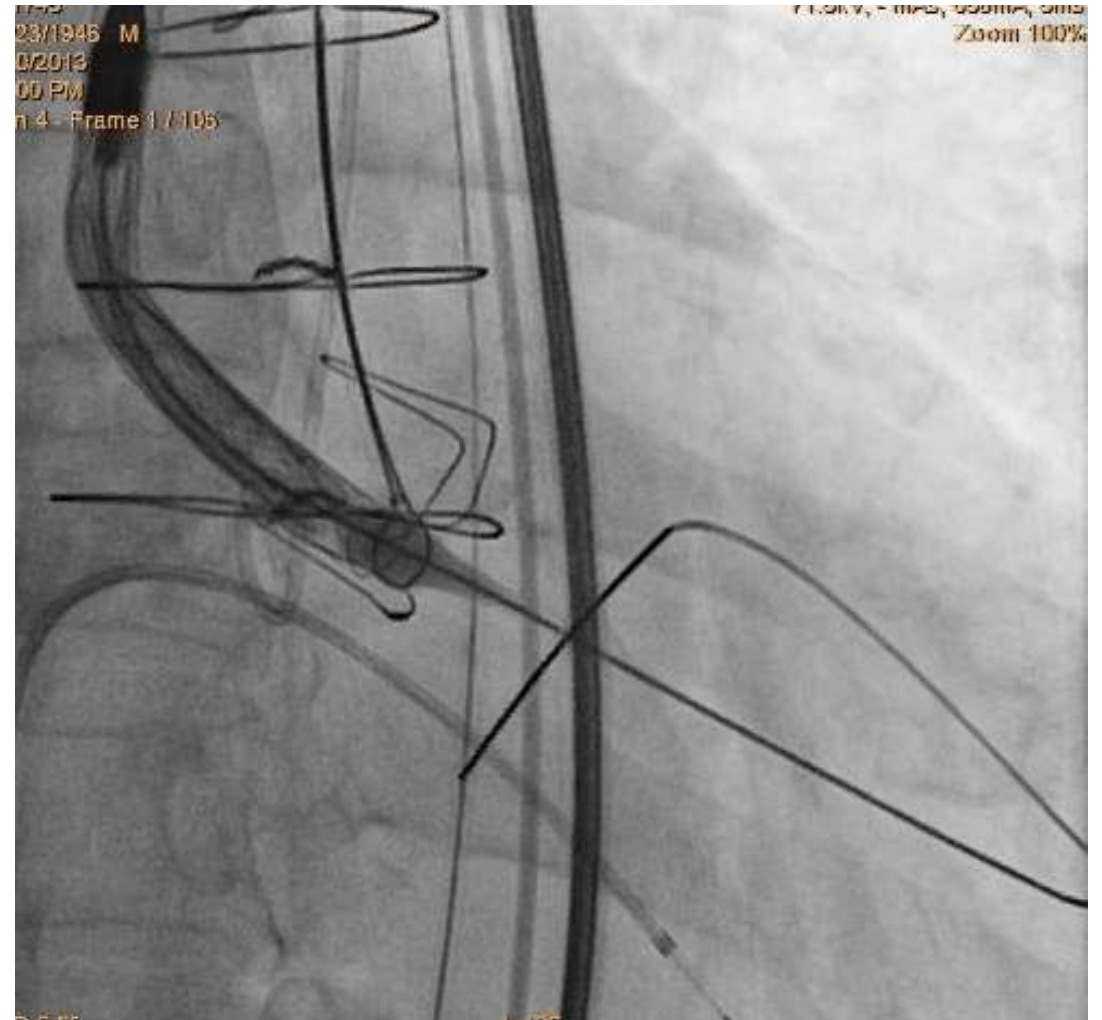


- Snare
  - Contralateral femoral artery or brachial/radial
- Valve delivery system has to go through snare

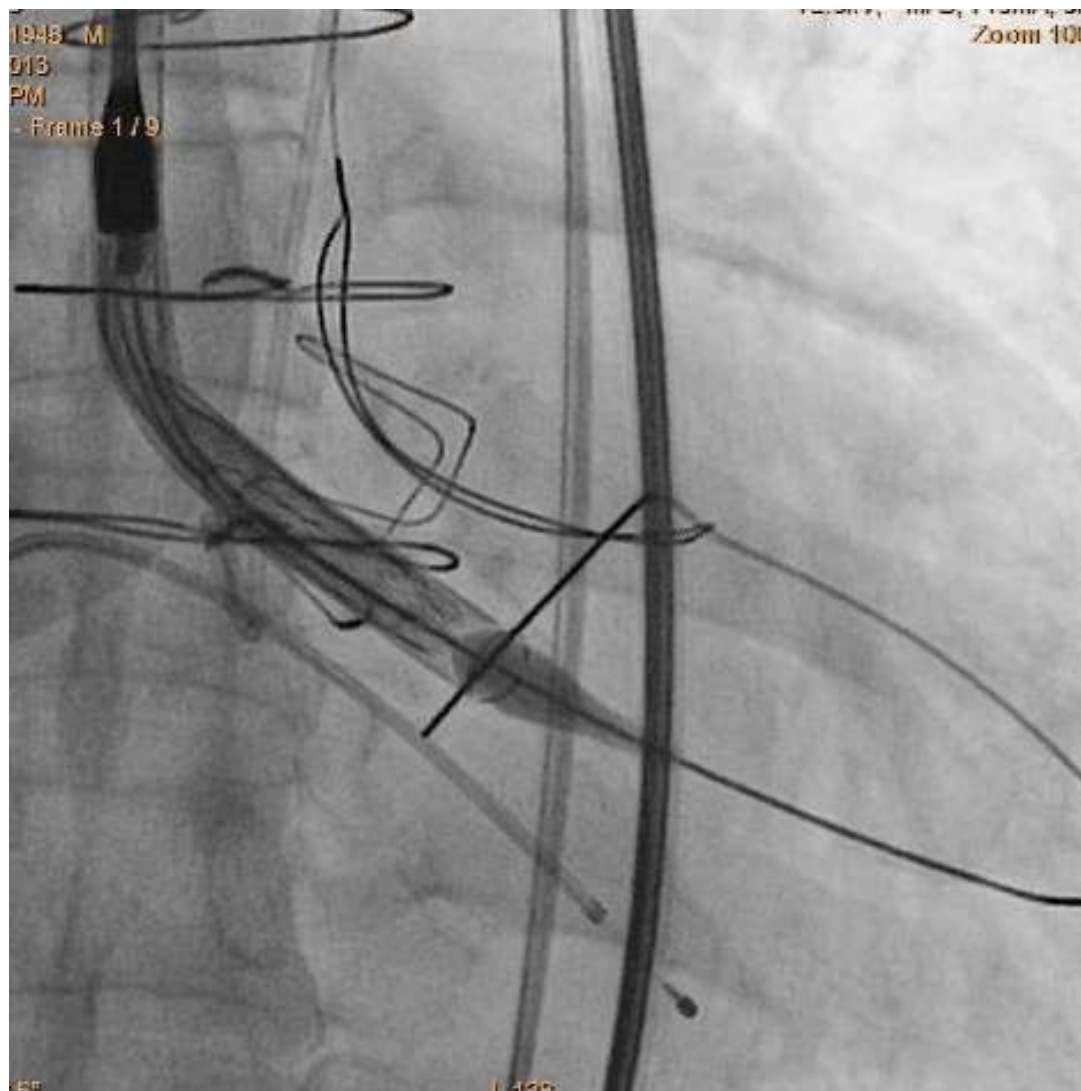




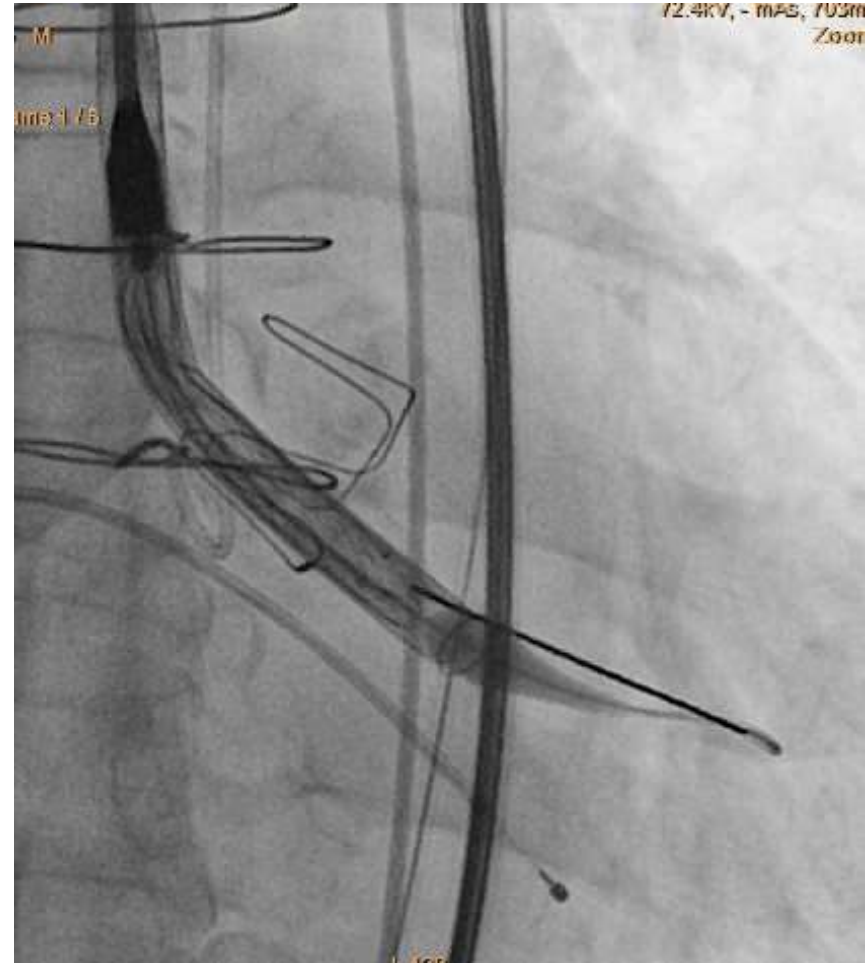
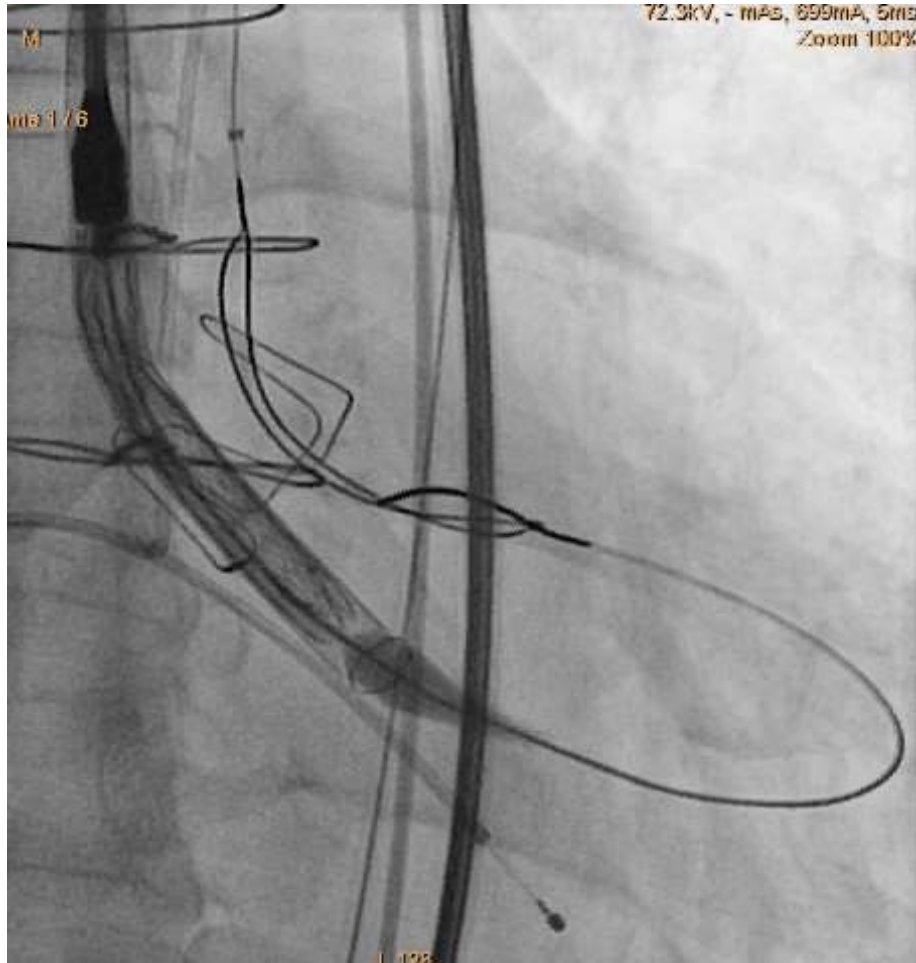
- Venus valve lifted away from the frame of the bioprosthetic valve
- Stepwise advancement of the Venus valve



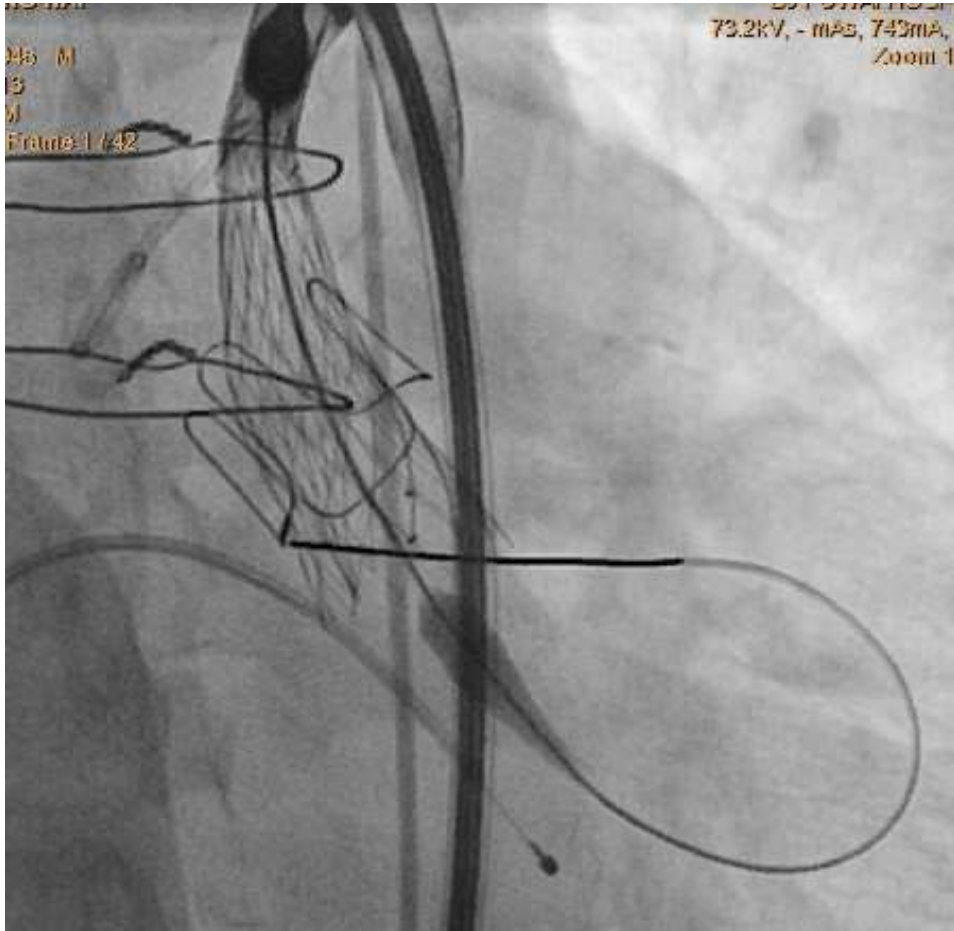
- Snare released



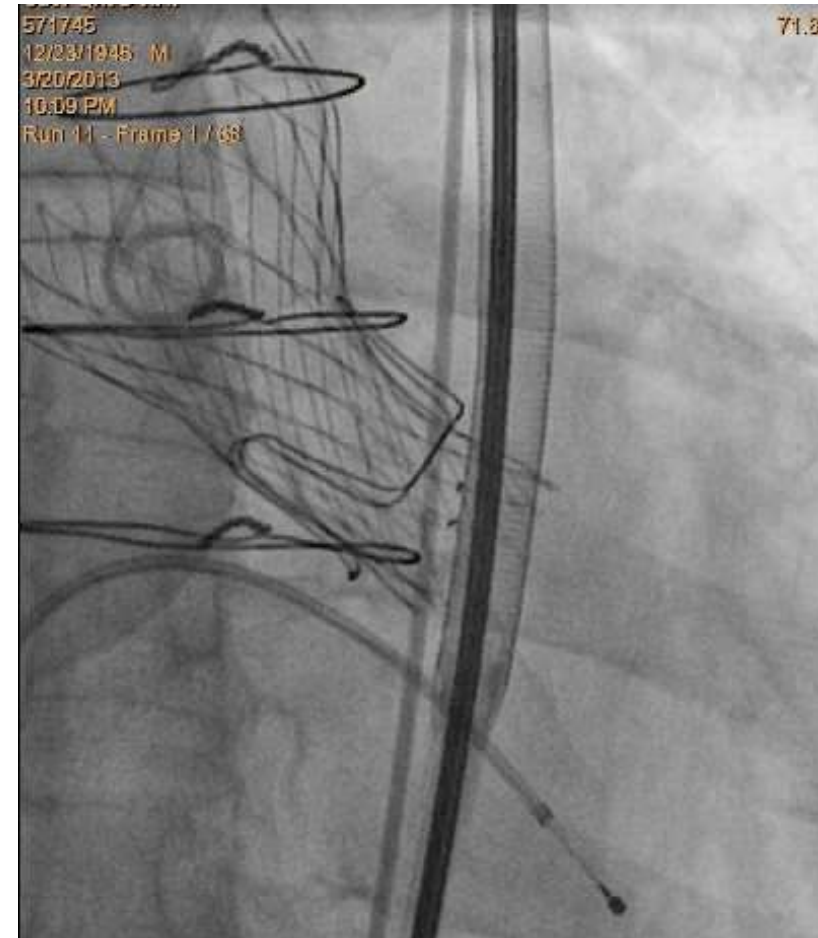
- Snare removal



- Valve implantation



- Final angio



# In Summary

- Aortic valve in valve procedures can be performed safely and with results at least comparable to redo-surgery
- There are ways to prevent problems like residual gradients in small valves, coronary obstruction and other complications
- Valve in valve instead of redo surgery should be considered at least in high risk patients