

Navigating TAVR Failure Using App-Guided Decision Making

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Minneapolis Heart Institute Foundation



TRANSCATHETER
CARDIOVASCULAR
THERAPEUTICS®

Disclosure of Relevant Financial Relationships

Within the prior 24 months, I have had a financial relationship with a company producing, marketing, selling, re-selling, or distributing healthcare products used by or on patients:

Nature of Financial Relationship

Grant/Research Support

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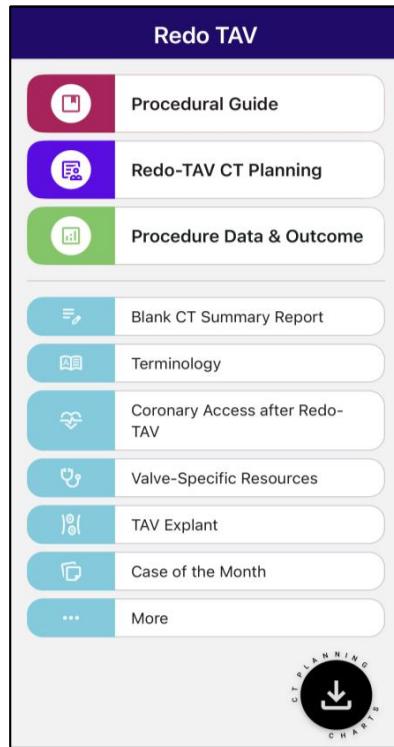
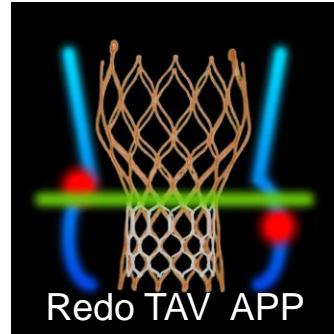
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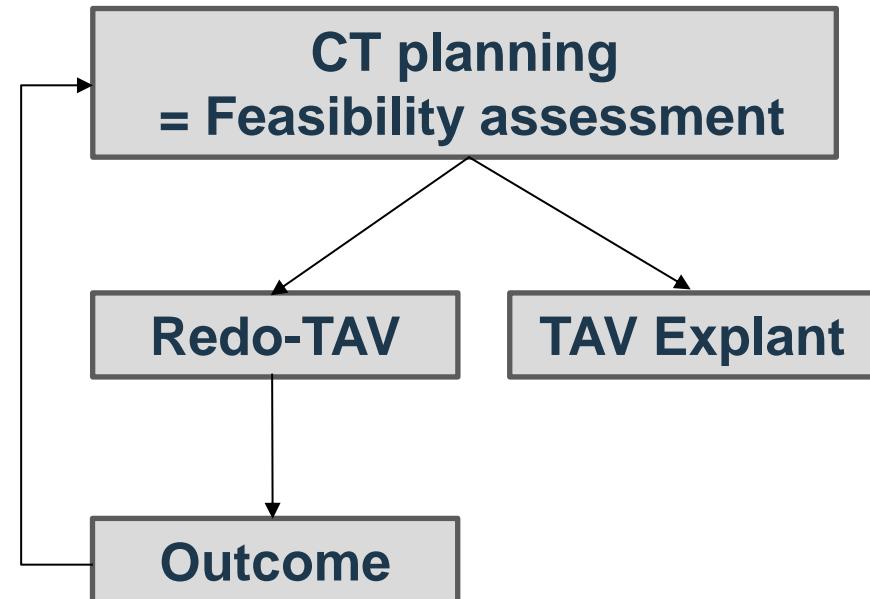
App is practical tool for navigating TAVR failure

From feasibility assessment to procedure



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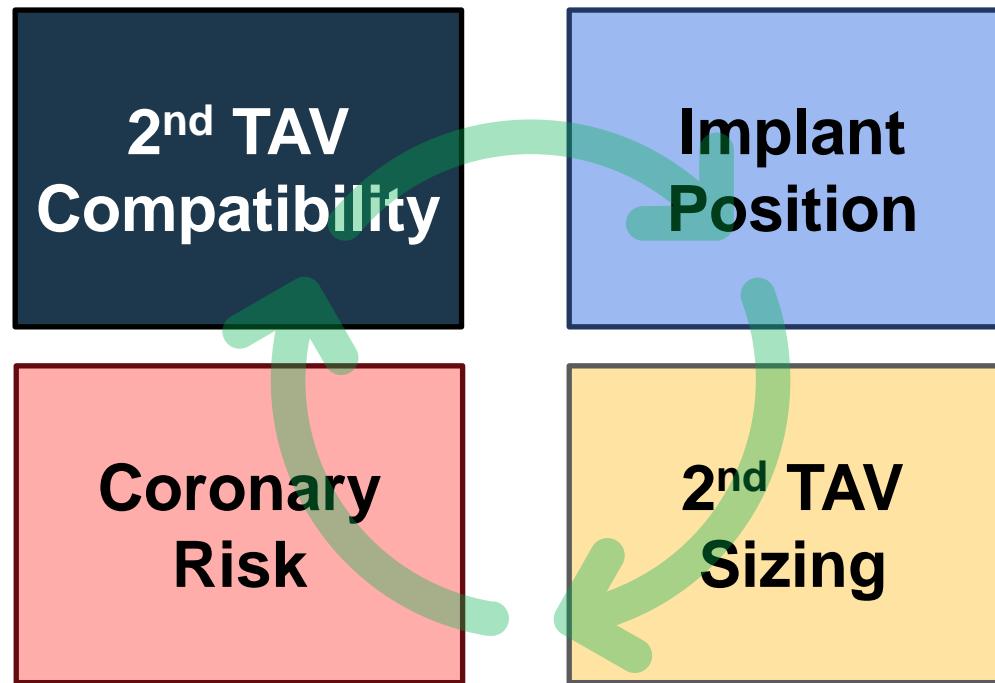


A Guide to Transcatheter Aortic Valve Design and Systematic Planning for a Redo-TAV (TAV-in-TAV) Procedure

Vinayak N. Bapat, MBBS, MCh^{a,b}; Miho Fukui, MD, PhD,^a Syed Zaid, MD,^c Atsushi Okada, MD, PhD,^a



4 Key Elements for Feasibility and Optimal Procedure



CT planning

The App offers one standardized pathway

Index TAV

TAV: Evolut R
Size: 29

Second TAV

TAV: Evolut FX
Size: 29

Area & Perimeter According to In-Vivo Sizing Algorithm

Area: 405.3 mm² Perim: N/A

Index TAV Failure Mechanism: AS

CRP: Node 4

NSP: Node 6

Summary - Not to Scale

Narrowest VTA Values

RCA: 1.1 mm
LCA: 2.2 mm

Caution
Consider coronary protection if in doubt

High risk to coronaries

Index TAV

TAV: Evolut R
Size: 29

Second TAV

TAV: SAPIEN 3 Ultra
Size: 23

Area & Perimeter According to In-Vivo Sizing Algorithm

Area: 405.3 mm² Perim: N/A

Index TAV Failure Mechanism: AS

CRP: Node 4

NSP: Node 6

Summary - Not to Scale

Narrowest VTA Values

RCA: 1.1 mm
LCA: 2.2 mm

Caution
Consider coronary protection if in doubt

High risk to coronaries

Index TAV

TAV: Evolut R
Size: 29

Second TAV

TAV: SAPIEN 3 Ultra
Size: 23

Area & Perimeter According to In-Vivo Sizing Algorithm

Area: 413 mm² Perim: N/A

Index TAV Failure Mechanism: AS

CRP: Node 4

NSP: Node 5

Summary - Not to Scale

Narrowest VTA Values

RCA: 4.1 mm
LCA: 2.8 mm

Caution
Consider coronary protection if in doubt

Intermediate risk to coronaries

Index TAV

TAV: Evolut R
Size: 29

Second TAV

TAV: SAPIEN 3 Ultra
Size: 26

Area & Perimeter According to In-Vivo Sizing Algorithm

Area: 433 mm² Perim: N/A

Index TAV Failure Mechanism: AS

CRP: Node 4

NSP: Node 4

Summary - Not to Scale

Narrowest VTA Values

RCA: N/A
LCA: N/A

Caution
Consider coronary protection when

Low risk to coronaries

CT planning

Generate Animated Summary

Redo TAV

- Procedural Guide**
- Redo-TAV CT Planning**
- Procedure Data & Outcome**
- Blank CT Summary Report** (highlighted with a red border)
- Terminology**
- Coronary Access after Redo-TAV**
- Valve-Specific Resources**
- TAV Explant**
- Case of the Month**
- More**

CT PLANNING CHARTS

Index TAV

TAV: Select... Size: Select...

Second TAV

TAV: Select... Size: Select...

Index TAV Failure Mechanism: Select...

Index TAV Avg. Area & Perim. for In-Vivo Sizing

Area: Enter... mm² Perim: Enter... mm

CRP: Select...

NSP: Select...

RCA **LCA**

NSP Above/Below RCA? NSP Above/Below LCA?

Above Below Above Below

NSP Above/Below STJ? NSP Above/Below STJ?

Above Below Above Below

Enter VTA Measurements Enter VTA Measurements

VTSTJ: Enter mm VTSTJ: Enter mm

VTAoS: Enter mm VTAoS: Enter mm

VTC: Enter mm VTC: Enter mm

Index TAV

TAV: Evolut R Size: 29

Second TAV

TAV: SAPIEN 3 Ultra Size: 23

Index TAV Failure Mechanism: AS

Index TAV Avg. Area & Perim. for In-Vivo Sizing

Area: 413 mm² Perim: 67 mm

CRP: Node 4

NSP: Node 5

RCA **LCA**

NSP Above/Below RCA? NSP Above/Below LCA?

Above Below Above Below

NSP Above/Below STJ? NSP Above/Below STJ?

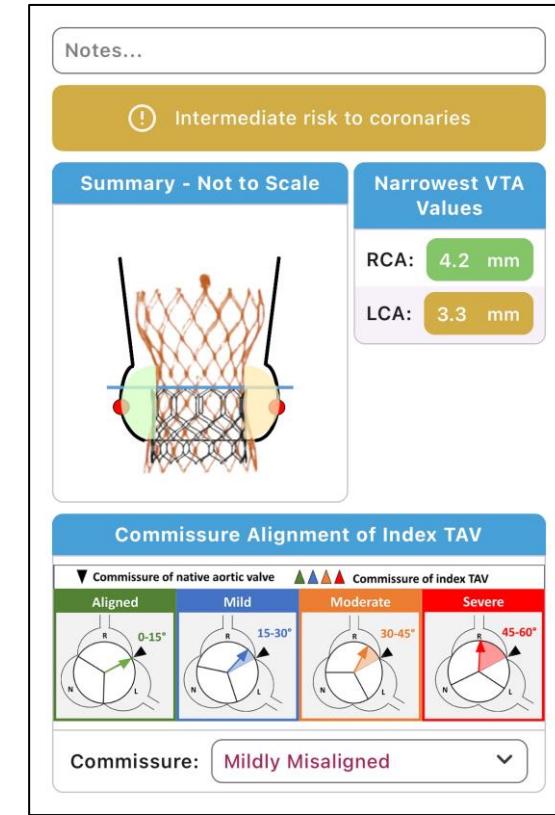
Above Below Above Below

Enter VTA Measurements Enter VTA Measurements

VTSTJ: N/A VTSTJ: N/A

VTAoS: Enter mm VTAoS: 3.3 mm

VTC: 4.2 mm VTC: 5.2 mm



CT planning

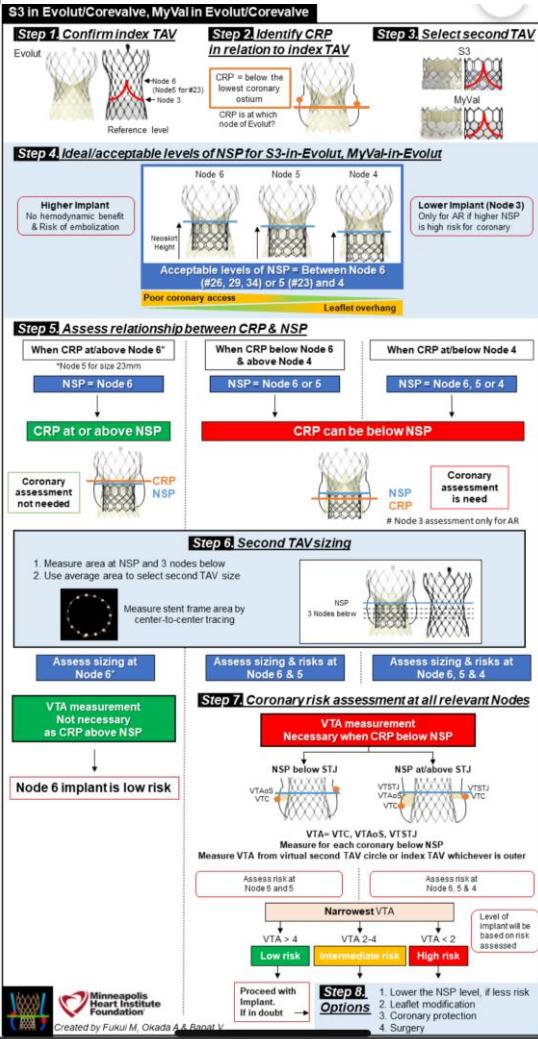
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 CRF® TCT™

 Minneapolis Heart Institute Foundation

Created by Fukuk M, Okada A & Banapal V



Now chart is available

CT Planning Charts

Short In Tall: SAPIEN 3 in Evolut FX

Index TAV specific resources

Evolut Family (Medtronic)

Design

- Tall frame
- Supra-annular leaflet
- Self expanding
- Sizes: 23, 26, 29, 34

Compatible Second TAV Devices

- Short: SAPIEN 3 family
- MyVal
- Tall: Evolut family

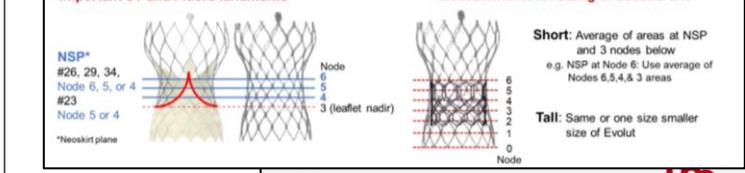


Important CT and Fluoro landmarks

Measurements for sizing of Second TAV

Short: Average of areas at NSP and 3 nodes below
e.g. NSP at Node 6: Use average of Nodes 6,5,4,& 3 areas

Tall: Same or one size smaller size of Evolut



Index TAV specific resources

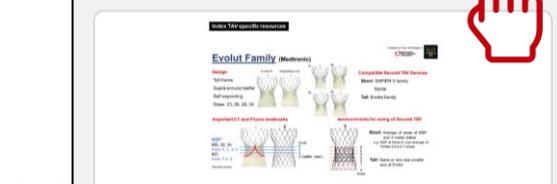
Evolut Family (Medtronic)

Design

- Tall frame
- Supra-annular leaflet
- Self expanding
- Sizes: 23, 26, 28, 30, 32, 34

Important CT and Fluoro landmarks

Measurements for sizing of Second TAV

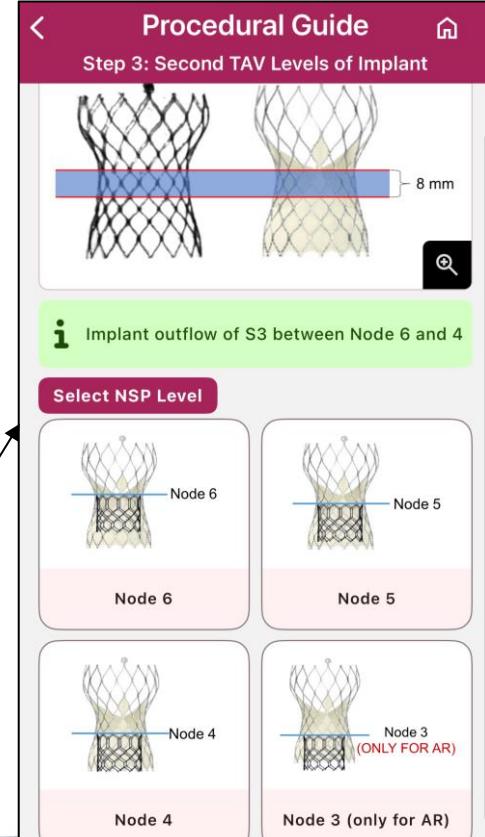
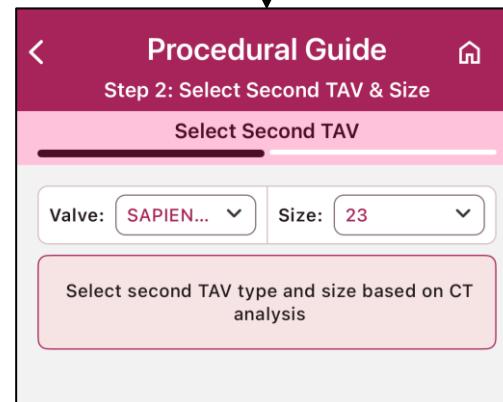
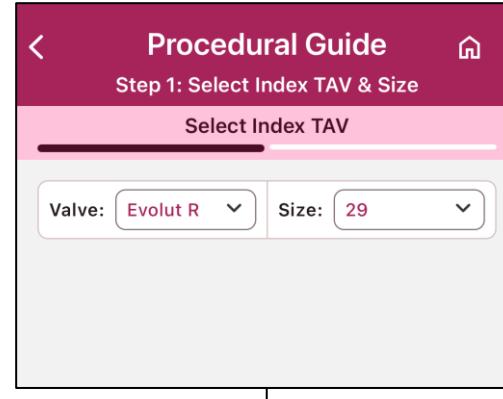
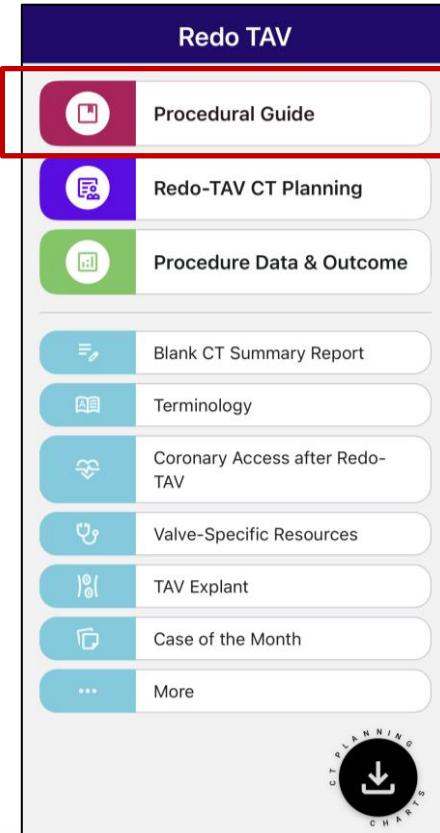






Procedure

From CT Analysis to Procedure



Procedure

Procedural Guide

Step 3: Second TAV Levels of Implant

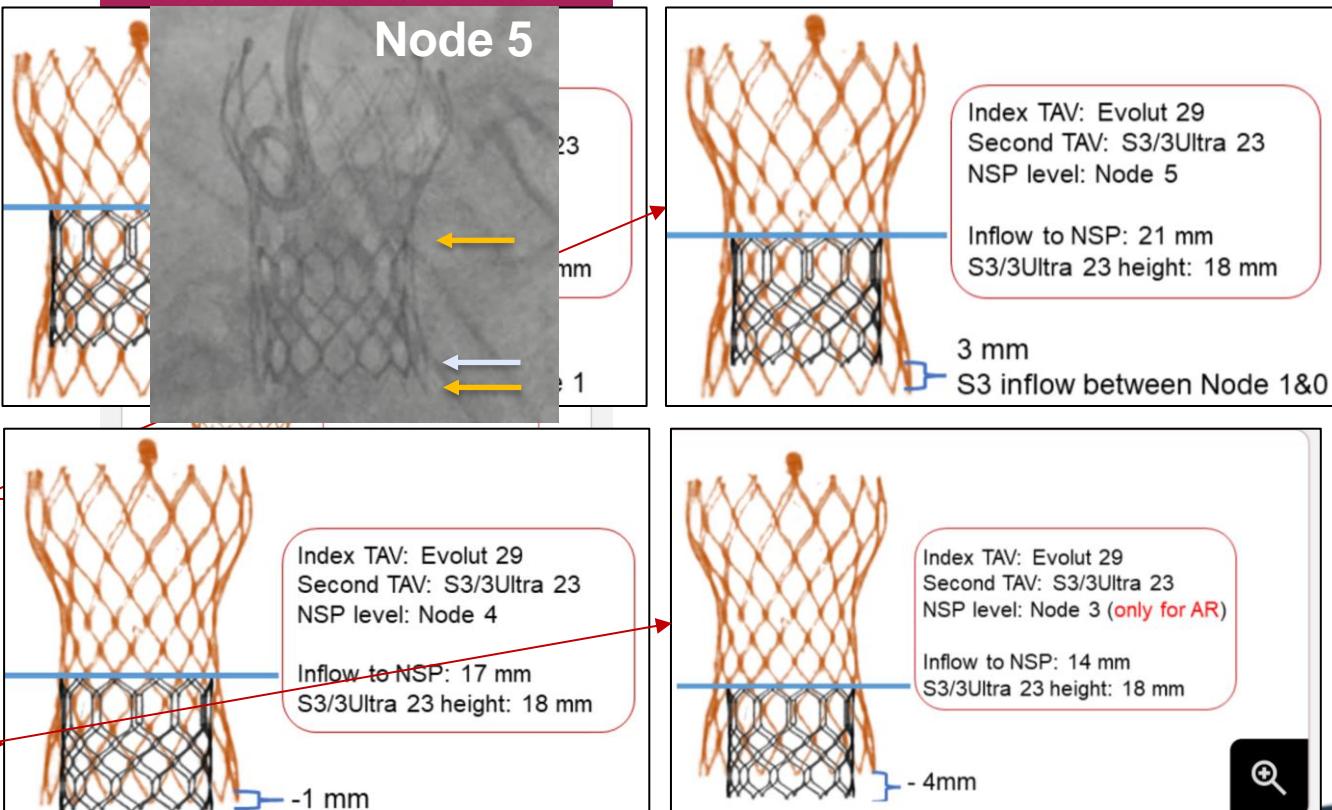
Implant outflow of S3 between Node 6 and 4

Select NSP Level

Node 6	Node 5
Node 6	Node 5
Node 4	Node 3 (ONLY FOR AR)
Node 4	Node 3 (only for AR)

Procedural Guide

Step 4: Second TAV Implementation



Outcomes

Page 1 Procedure Data

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Index TAV

TAV: Evolut R
Size: 29

Second TAV

TAV: SAPIEN 3 Ultra
Size: 23

Pre-Dilatation?

Yes No

Balloon Size: 22 mm

Deployment of Second TAV

Inflation Volume: Nominal

Post-Dilatation?

Yes No

With Delivery System: Yes
Volume Added: 0 cc

Coronary Protection?

Yes No

Coronary Protection: Right

Coronary Snorkel Stenting?

Yes No

Leaflet Modification?

Yes No

Page 2 Outcome

NSP After implant

NSP: Node 5

Final Mean Gradient by Cath: 2 mmHg

Final Mean Gradient by Echo: 5 mmHg

Transvalvular AR: None

Paravalvular AR: None

Intraprocedural Death?

Yes No

Conversion to Surgery?

Yes No

Valve Embolization?

Yes No

Another TAV Needed?

Yes No

Annulus Injury?

Yes No

Acute Coronary Obstruction?

Yes No

Obstruction: Right

Suspected Mechanism: Select...

PCI Needed: Select...

Post Redo-TAV

Educational contents

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< Coronary Access after... >

- 1. Access and Catheters**
- 2. Fluoroscopy & Redo-TAV
- 3. Sinus Sequestration
- 4. Leaflet Overhang
- 5. Commissural & Cell Alignment
- 6. Coronary Obstruction

Acknowledgements

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- Daniel Dusek
Institute of Cardiology Jagiellonian University Medical College, Krakow, Poland

< Coronary Access after... >

Access and Catheters

Traditional approaches to coronary cannulation may not be feasible after Redo-TAV. Access as well as selection of catheters may play an important role to simplify this issue as well as provide access in shortest possible time.

In this section we discuss radial vs femoral access and also discuss different catheters.

Coronary access and Techniques a

Watch on [YouTube](#)

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- More



TAV Explant

- 1. TAV Devices
- 2. CT Scan Assessment
- 3. Procedural Steps**
- 4. Valve Explant Techniques
- 5. Advance Considerations

TAV Explant

Procedural Steps

Clinical scenarios when TAV explant is performed for structural degeneration and/or paravalvular leak.

Key learning points

1. Cannulation and Cross-clamp
2. Incision on the aorta
3. Cardioplegia
4. Dissection of the device from surrounding structures
 1. Tall devices
 2. Short devices
5. Removal

Video Links

Search... 1 - 4 of 4

- Evolut R TAV explant after 5 years for degeneration stenosis and regu...
- Evolut R TAV explant after 2 years for severe PV leak and mitral surg...
- Tourniquet Technique Evolut R
- Sapien 3 S3 explant tips

Terminology

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Terminology

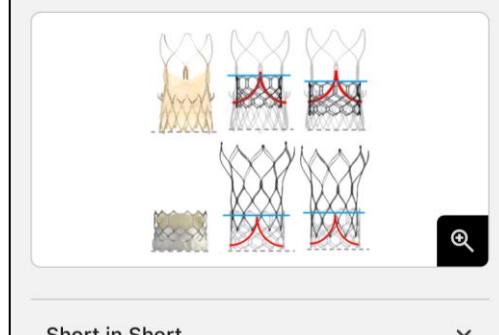
- 1. Neoskirt and Neoskirt Plane**
- 2. Coronary Risk Plane
- 3. VTAoS, VTC and VTSTJ
- 4. Leaflet Overhang
- 5. Commissure Alignment
- 6. Coronary Protection

Terminology

Neoskirt & NSP

Neoskirt Plane (NSP)

NSP is defined as the plane at the top of the Neoskirt once the redo-TAV combination is selected. The NSP is unique to the redo-TAV combination and may be at single or multiple levels. In combinations where multiple levels are feasible, the level is determined by the implant position of second TAV within the index TAV. Relationship of the NSP to the native anatomy i.e., coronary ostia, sinotubular junction (STJ) etc., will vary according to the depth of the index TAV.



Short in Short

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< Valve-Specific Resources >

- 1. ACURATE neo/neo2
- 2. Allegra
- 3. Evolut R/PRO/PRO+/FX
- 4. Lotus
- 5. MyVal
- 6. Portico/Navitor
- 7. SAPIEN 3/SAPIEN 3 Ultra
- 8. SAPIEN XT

< Valve-Specific Resources >
Portico/Navitor

- 1. Valve Design
- 2. Valve Dimensions
- 3. Second TAV Options
- 4. NSP Levels
- 5. CT Analysis Example
- 6. Sizing Table
- 7. Video Section

< Valve-Specific Resources >
Portico/Navitor: Valve Design

Design: Self expandable, Nitinol stent frame, Tall device

Iterations: Portico, Navitor

Intra-annular

Sizes: 4 (23, 25, 27, 29)

Shape: All sizes have the same shape.

Landmarks:

Nadir of leaflets: Node 1

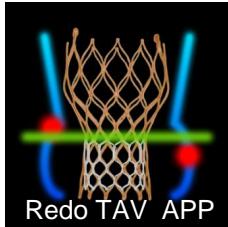
Top of Leaflets: Commissure tab (leaflet height)

This App Reflects Everyone's Contribution

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 Gilbert Tang Mount Sinai Hospital New York, USA	 Dariusz Dudek Jagiellonian University Medical College	 Michael Reardon Baylor College of Medicine Houston, USA		

Take-home Message

- This App has been created through global collaboration
- It's not the final: it's a starting point for continued learning
- Our goal: to make Redo-TAV simpler, standardized, and optimal
- Need to continue to refine it - just as we did for TAVR in native AS



A Guide to Transcatheter Aortic Valve Design and Systematic Planning for a Redo-TAV (TAV-in-TAV) Procedure

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