Technical Considerations for TAVR in Bicuspid AS

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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	**Companies**
Consultant Fees/Honoraria	Abbott Laboratories, Boston Scientific, Edwards Lifesciences, Medtronic, GADA, Microport, SMT

All relevant financial relationships have been mitigated.
Faculty disclosure information can be found on the app

OPERATIVE OVERVIEW

- ❑ PHENOTYPING
- ❑ SIZING
- ❑ POSITIONING
- ❑ OPTIMIZATION

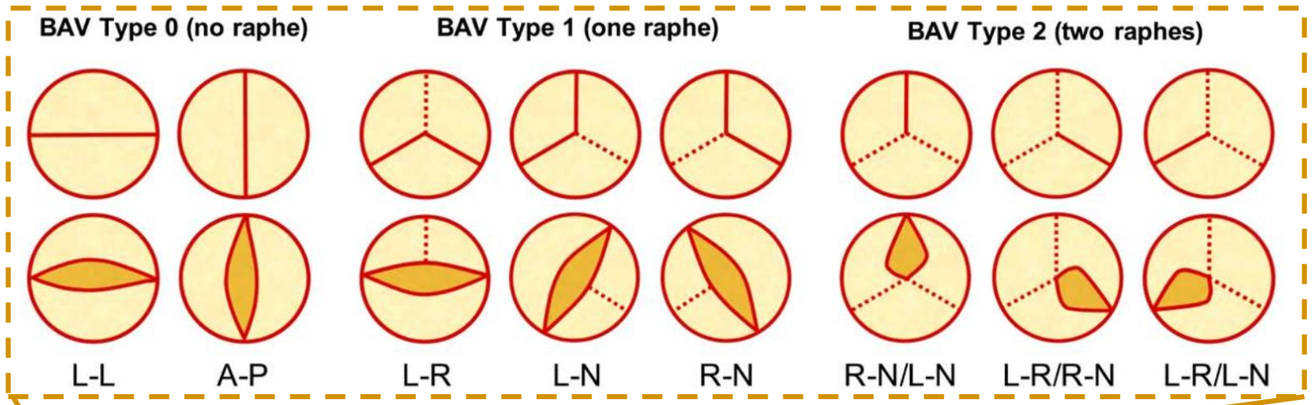
Tarantini G, Fabris T. Circ Cardiovasc Interv. 2021 Jul;14(7):e009827.

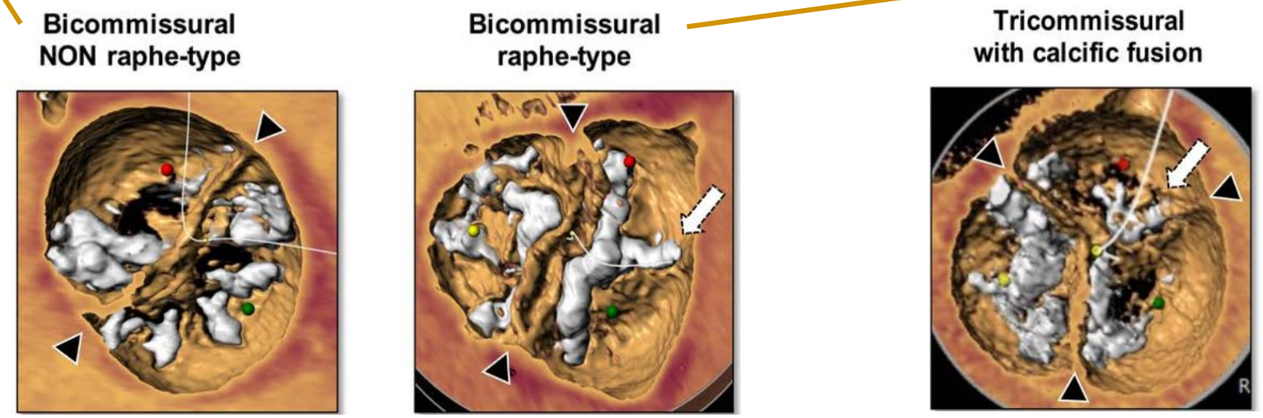
OPERATIVE OVERVIEW

- ❑ PHENOTYPING
- ❑ SIZING
- ❑ POSITIONING
- ❑ OPTIMIZATION

BAV MORPHOLOGY CHARACTERIZATION

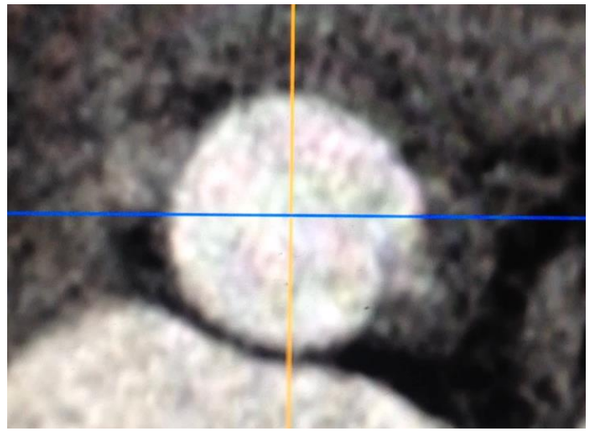
SIEVERS (SURGICAL-derived)[1]

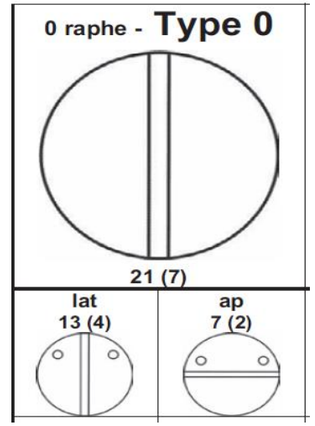


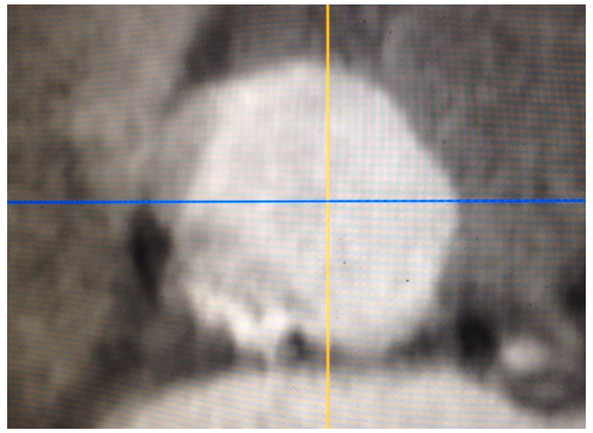


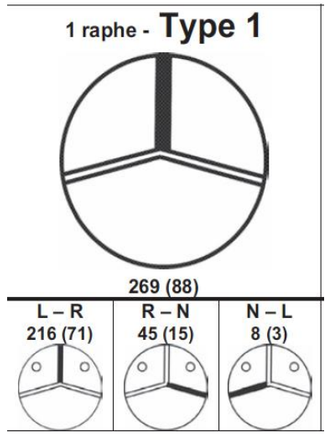
JILAIHAWY (Operative CT-derived)[2]

CT-SCAN









1. Sievers, et al., J Thorac Cardiovasc Surg 2007;133:1226-33.
2. Jilaihawy, et al., JACC Cardiovasc Imaging. 2016 Oct;9(10):1145-1158.

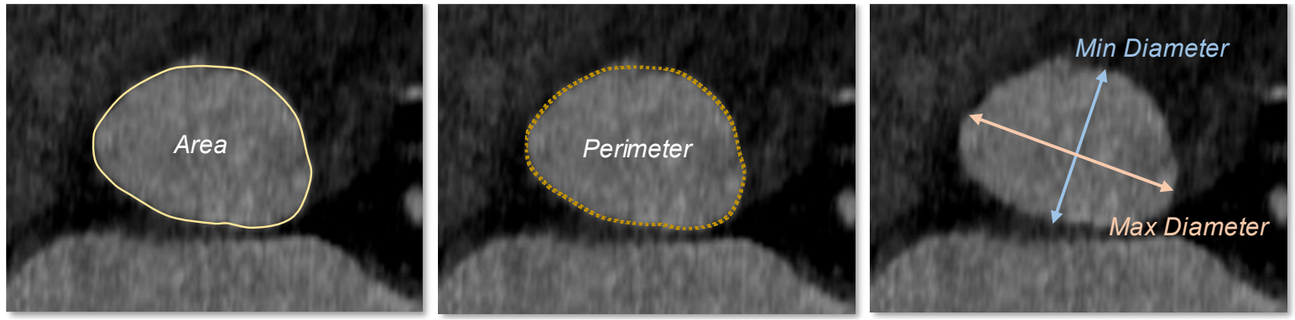
OPERATIVE OVERVIEW

- ❑ PHENOTYPING
- ❑ **SIZING**
- ❑ POSITIONING
- ❑ OPTIMIZATION

CT SCAN based #1

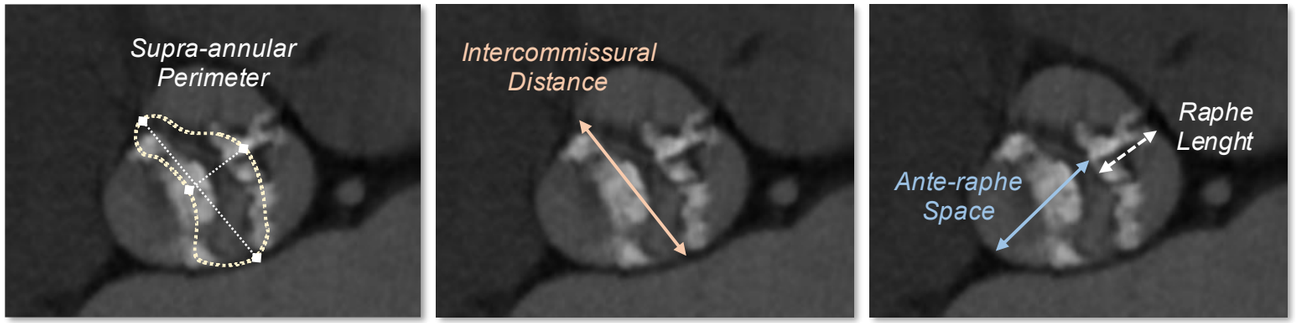
VIRTUAL BASAL RING (Annular)

***Challenging in Type 0 BAV**

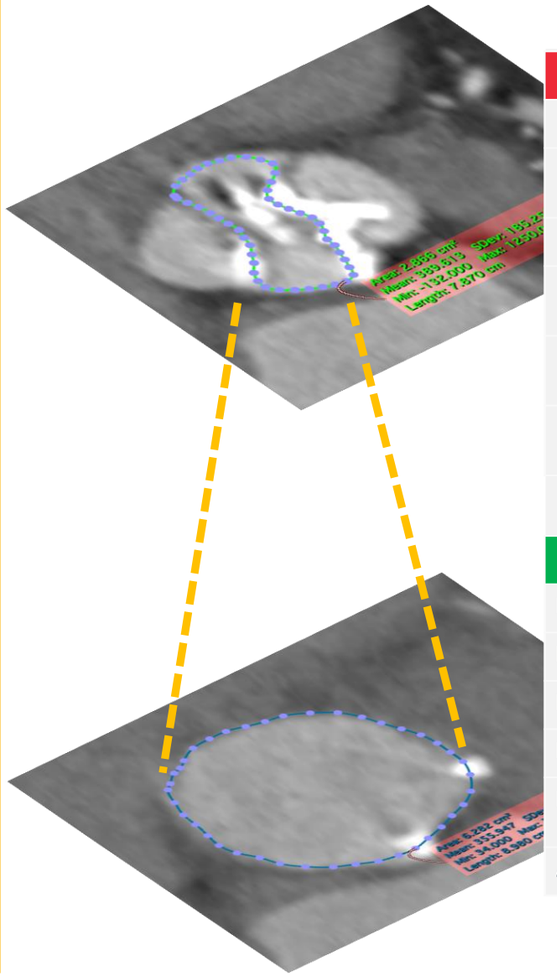


VIRTUAL RAPHE RING (Supra-annular)

***Multi-parametric evaluation**



VBR vs. VRR sizing



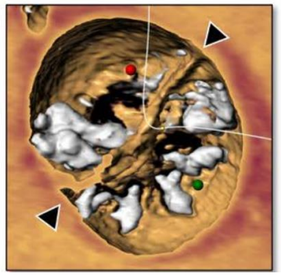
VIRTUAL RAPHE RING	Value
Perimeter (mm)	78.7
Intercommissural length (mm)	28.0
Ante-Raphe lenght	20.5
Perimeter-derived diam. (mm)	25.1
Perimeter (mm)	78.7
Intercommissural length (mm)	28.0

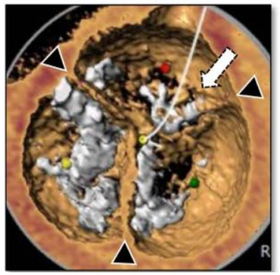
VIRTUAL BASAL RING	Value
Perimeter (mm)	89.8
Min Diam (mm)	27.2
Max Diam (mm)	28.4
Mean Diam (mm)	27.8
Perimeter-derived diam. (mm)	28.6
Area (mm^2)	628

Tchetche D, et al. Circ Cardiovasc Interv. 2019. Tarantini G, Fabris T. Circ Cardiovasc Interv. 2021 Jul;14(7):e009827.
Buono A, Fabris T, Tarantini G, et al. Int J Cardiol. 2024 Dec 15;417:132569.

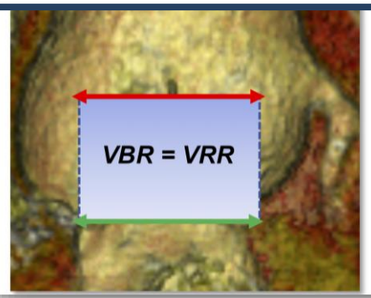
CT SCAN based #2

Type 0 Tricommissural

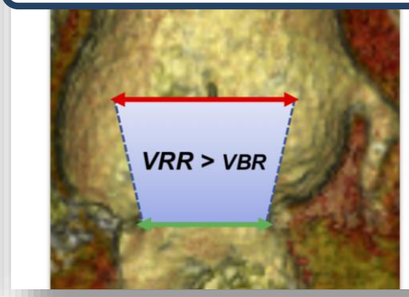




CO-DOMINANT

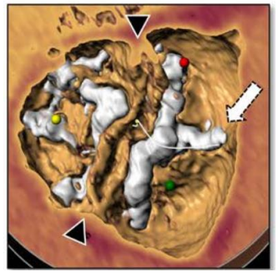


ANNULAR-DOMINANT



VBR sizing

Type 1 and 2



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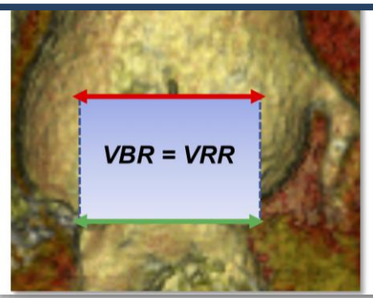
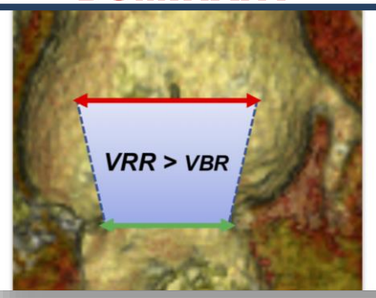
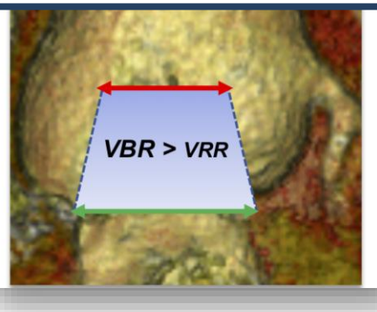


ANNULAR-DOMINANT



VBR sizing

RAPHE-DOMINANT



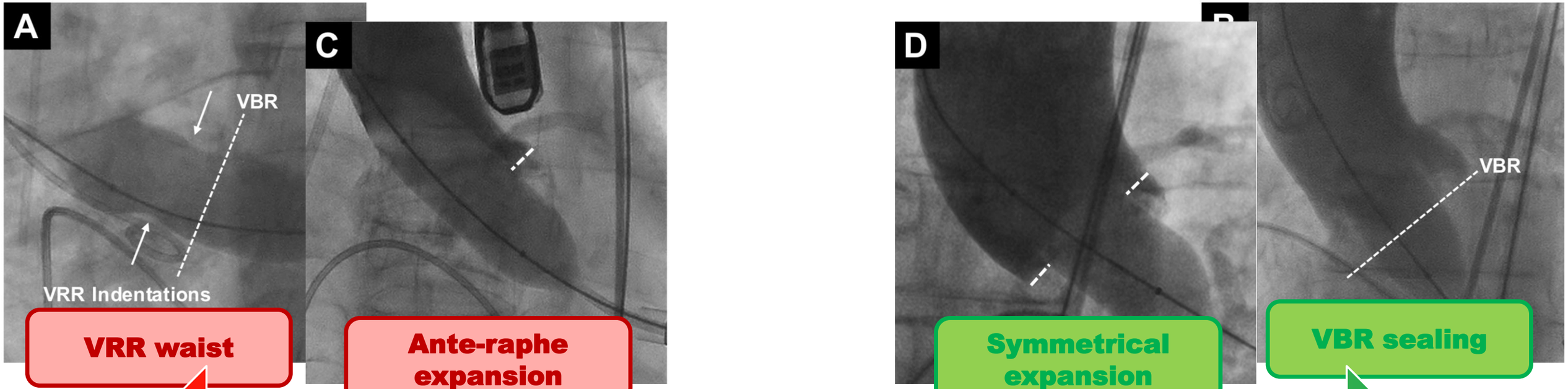
VRR sizing

Tarantini G, Fabris T. Circ Cardiovasc Interv. 2021 Jul;14(7):e009827.

BAV based #3

Balloon valvuloplasty to test the supra-annular structure

- ❑ **Supra-annular vs Annular WAISTING**
- ❑ **Symmetrical vs. Asymmetrical EXPANSION**



VRR waist

Ante-raphe expansion

Symmetrical expansion

VBR sealing

VRR sizing → **VBR sizing**

Tarantini G, Fabris T. Circ Cardiovasc Interv. 2021 Jul;14(7):e009827.
Chen, M. et al. JACC: Asia. 2021;1(2):147–161.

THV TYPE CHOICE

Evolut R/Pro/Pro+/Fx

CE mark for BAV from June 2020

- **Repositionable/Retrievable**
- **Lower risk of annular rupture[1,2]**
- **Supra-annular valve circular**
- **Better hemodynamics[1,2]**

- **More PVL[1,2]**
- **Higher risk of Pacemaker[1,2]**
- **Impaired Coronary Access**

Sapien 3/Ultra/Resilia

Caution for BAV removed from IFU

- **Higher radial force**
- **Maintains circular shape**
- **Lower PVL[1,2]**
- **Coronary «friendly»**

- **Higher risk of annular rupture[1,2]**
- **Higher risk of aortic dissection**

1. Tarantini G, Buono A, Fabris T, et al. JACC Intv 2024;01028-8.
2. Mangieri A, et al. Circ Cardiovasc Intv 2020;13(7):e008714.

OPERATIVE OVERVIEW

- ❑ PHENOTYPING
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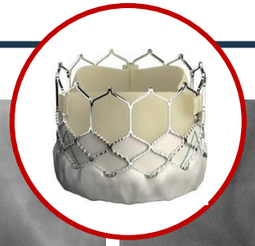
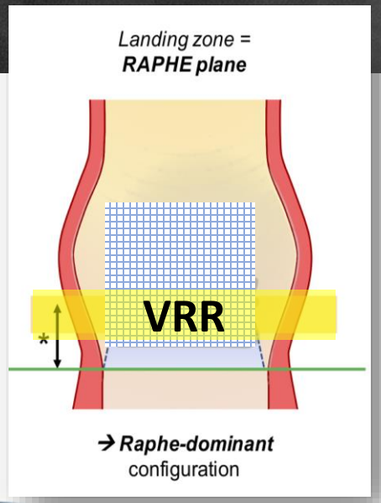
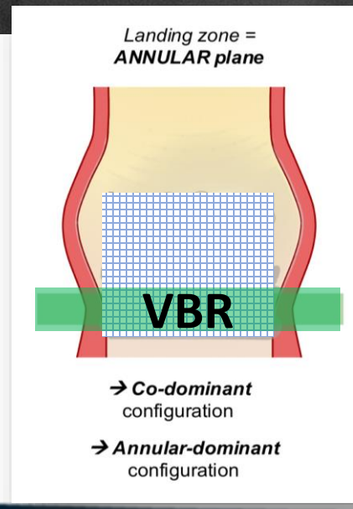
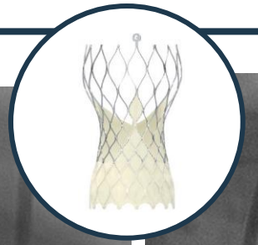
- ❑ **POSITIONING**
- ❑ OPTIMIZATION

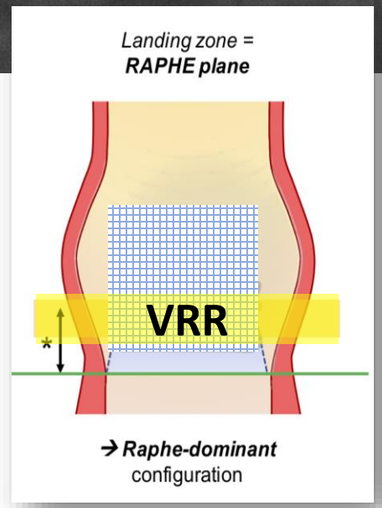
Annular- Vs. Supra-annular Positioning

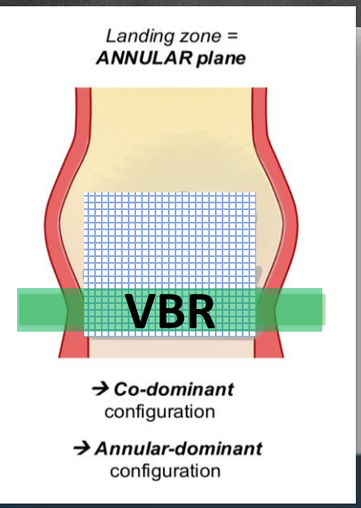






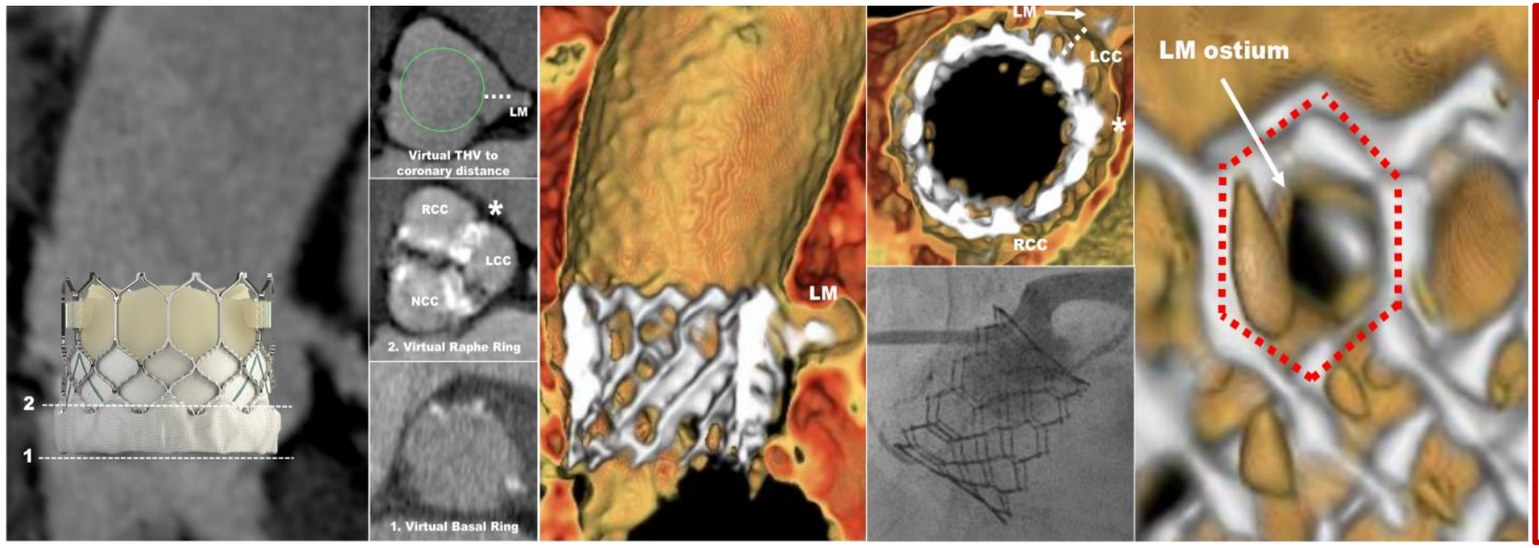






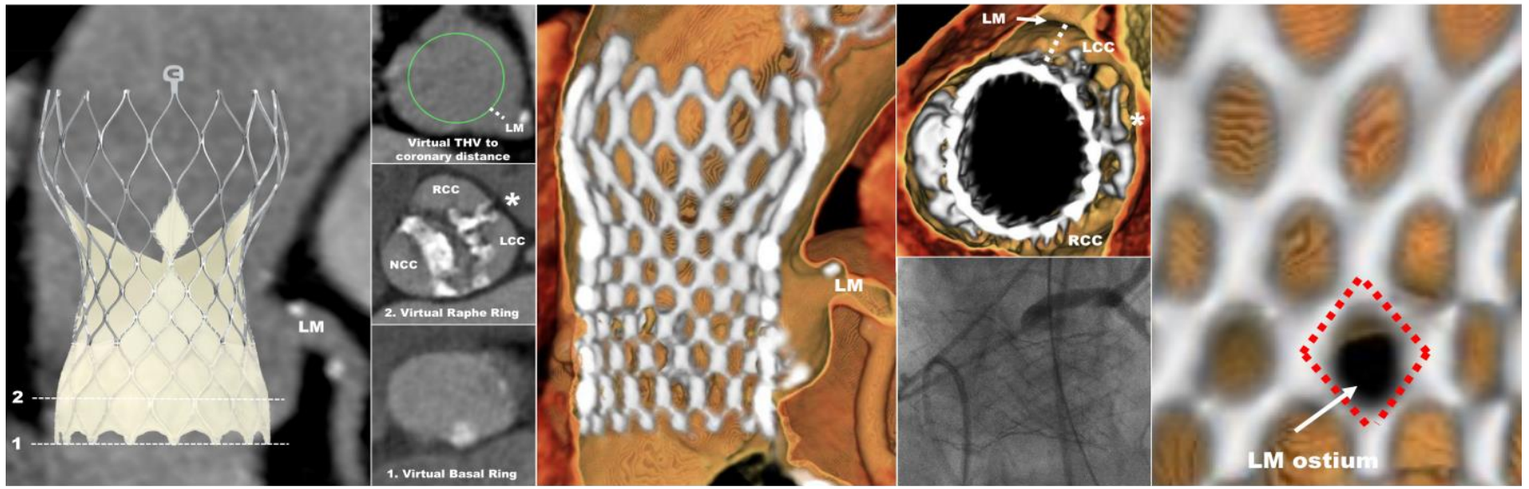
Tarantini G, Fabris T. Circ Cardiovasc Interv. 2021 Jul;14(7):e009827.
Blackman D, et al. Cardiol Ther. 2021 Dec;10(2):277-288.

Supra-annular Positioning shades



BEV

- ❑ **THV embolization risk**
- ❑ **Prosthesis-patient mismatch (down-sizing)**



SEV

- ❑ **Coronary access impairment[2]**
- ❑ **Redo-TAVR feasibility[1]**

Okada A, et al. JACC Intv 2025; 18 (9) 1174–1185. Tarantini G, Fabris T, et al. JACC Cardiovasc Interv. 2019 Jun 24;12(12):1190-1191. Tarantini G, Buono A, Fabris T, et al. JACC Intv 2024;01028-8.

OPERATIVE OVERVIEW

- ❑ PHENOTYPING
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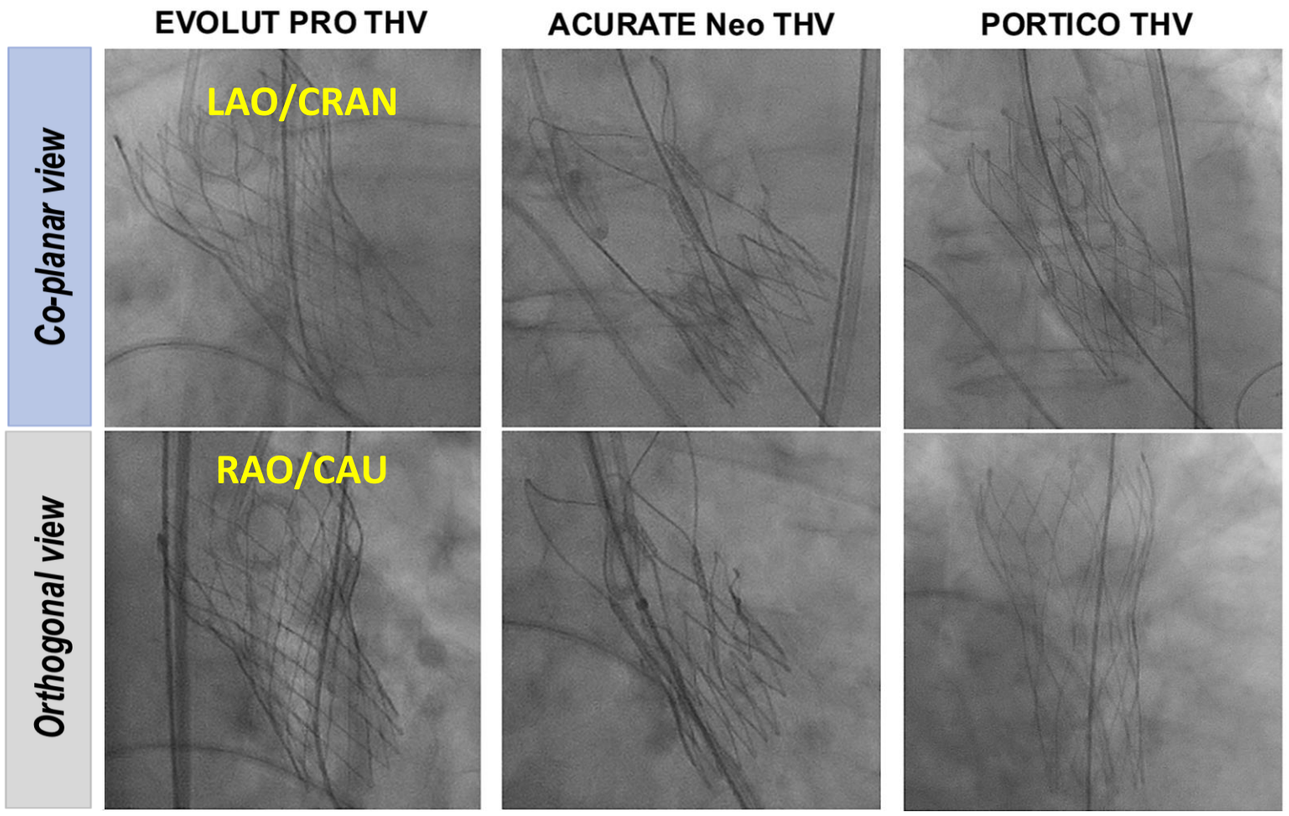
- ❑ **OPTIMIZATION**

THV expansion assessment

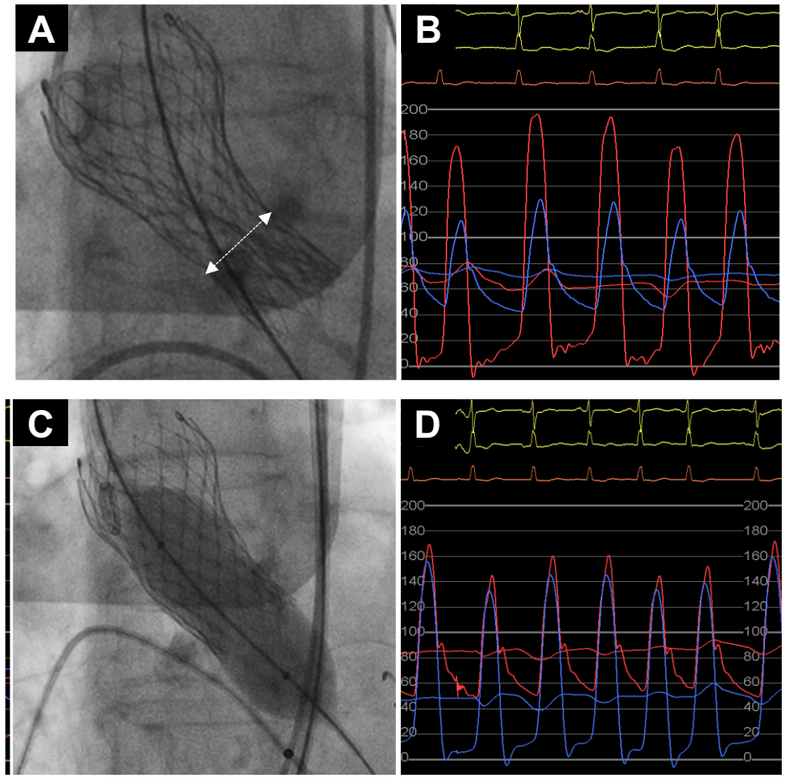
FLUOROSCOPIC



INVASIVE

EVOLUT 29-mm
RAPHE-TYPE BAV
P-P Grad 40 mmHg

Post-dilatation
23-mm CB
P-P Grad 10 mmHg



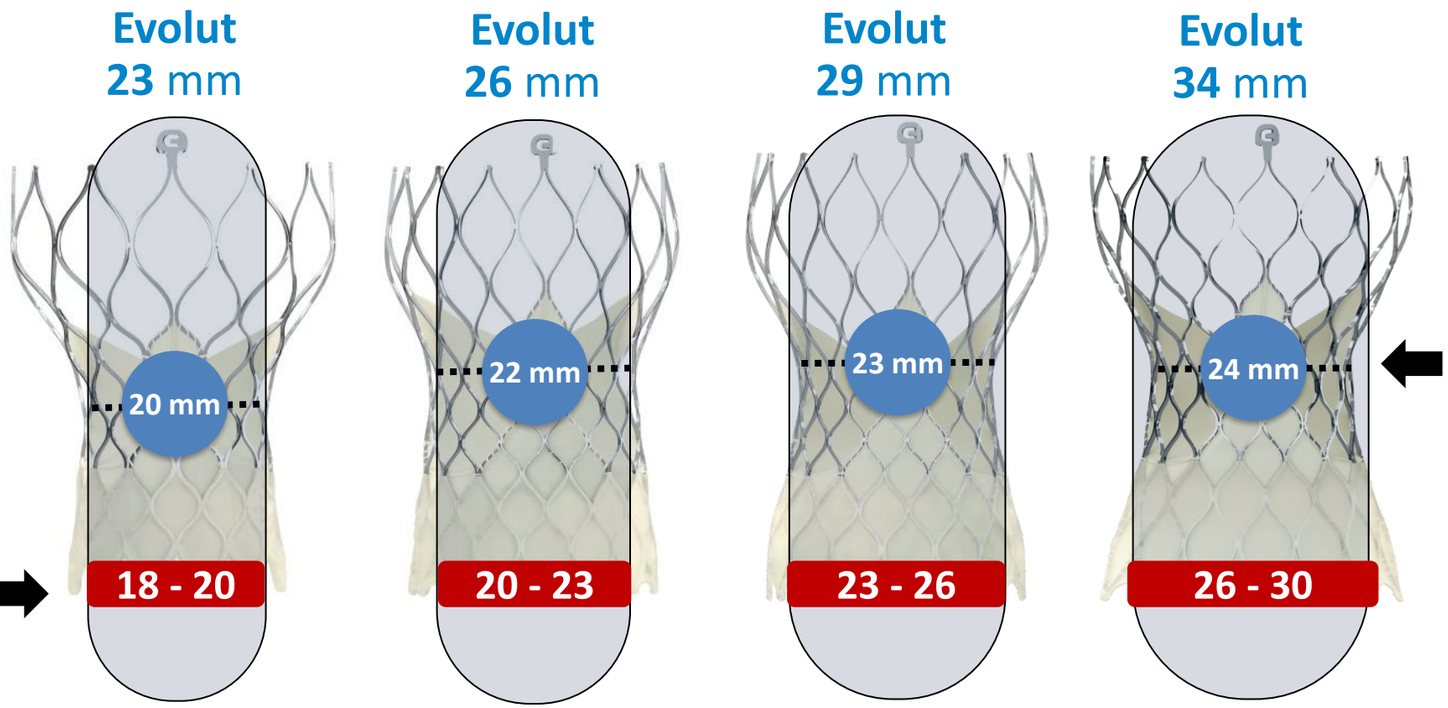
Arturi F, Tarantini G, et al. JACC Case Rep. 2025 Jan 15;30(2):102774.

Post-dilatation with SEVs

1

Minimal diameter at VBR or VRR (lower range of balloon size)

Treatable Annulus Range (mm)



2

Waist of the frame (upper range of balloon size)

Waist (mm)

Take home message

BAV is NOT a MONOLITIC ENTITY

- TAVR for NON-RAPHE TYPE and FUNCTIONAL BAV resemble classic TAV
- TAILORED THV SIZING and POSITIONING is the RULE in RAPHE-TYPE
- POST IMPLANT ASSESSMENT AND OPTIMIZATION IS RECOMMENDED

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