

REUNIÃO MENSAL SETEMBRO/2026



Procedural Strategies for Optimal Transcatheter Aortic Valve Replacement

An International Position Statement



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Expansão da TAVR para Pacientes Mais Jovens

Maior Expectativa de Vida

Perfil crescente de pacientes mais jovens e de menor risco

Durabilidade a Longo Prazo

Foco em resultados clínicos sustentados e na longevidade da prótese
Lifetime Management

Objetivos

Resultados melhores e duráveis, evitando distúrbios de condução, preservando acesso coronário e facilitando futuro TAVI-in-TAVI



Framework TAVR CODE: Visão Geral

Quatro pilares para o implante ótimo de válvulas aórticas transcater:



C — Coaxialidade

Alinhamento simétrico do dispositivo em relação ao anel nativo



O — Orientação

Alinhamento comissural



D — Profundidade

Posicionamento axial preciso para reduzir complicações



E — Expansão

Expansão adequada para performance hemodinâmica

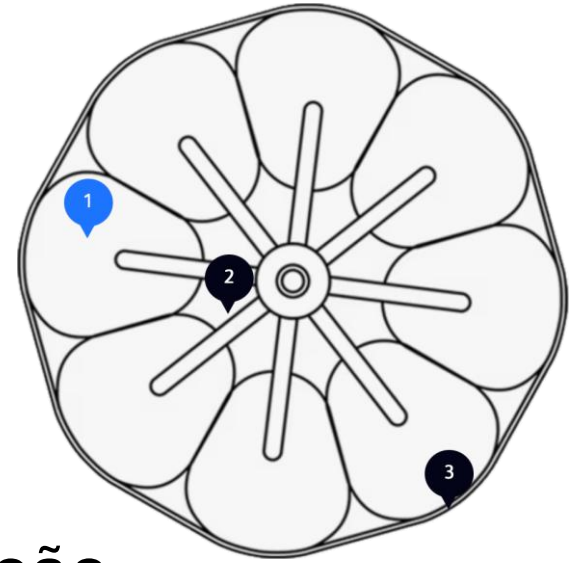
METODOLOGIA

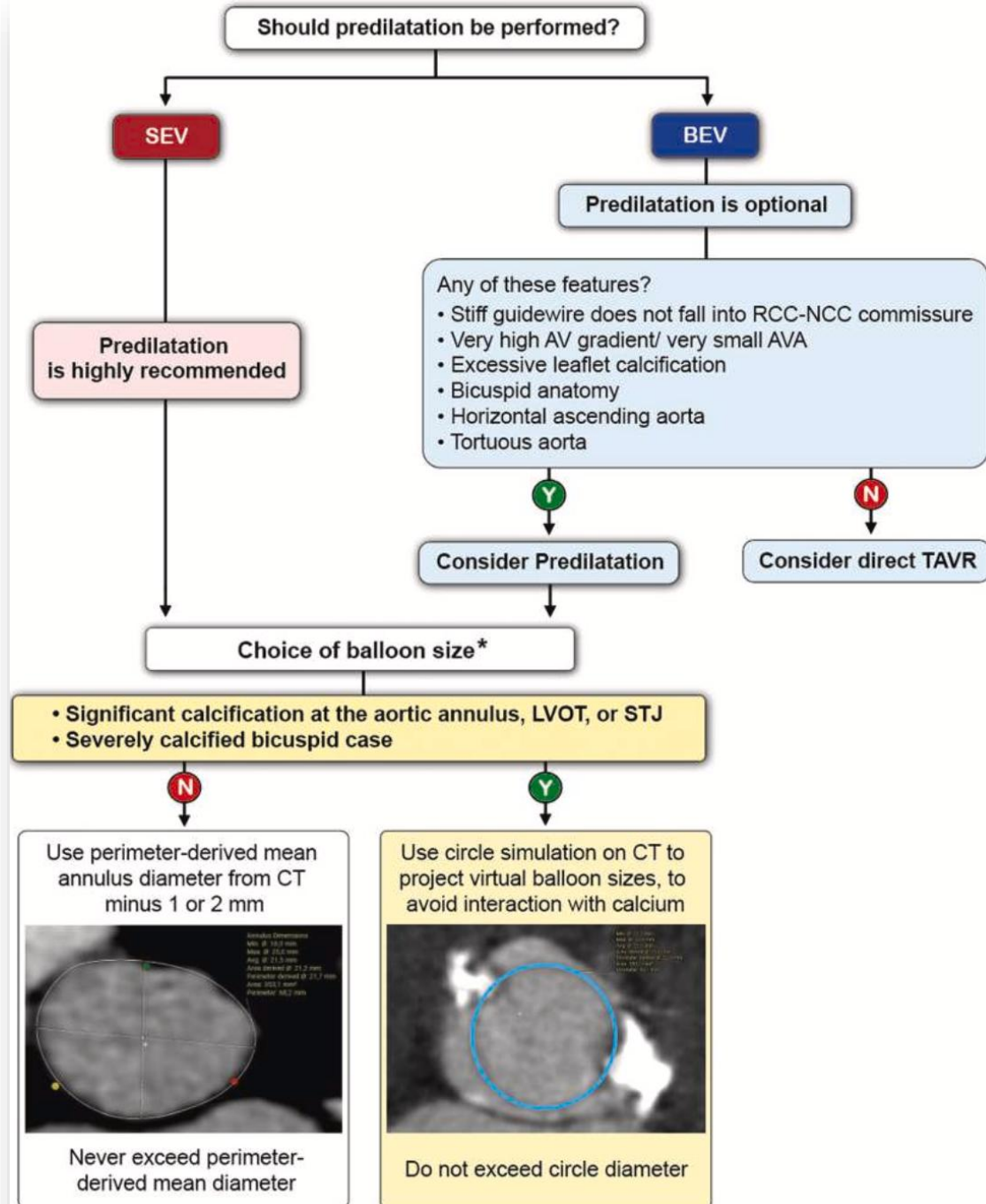
- Fevereiro/2026
- 27 especialistas de 27 centros em 13 países.



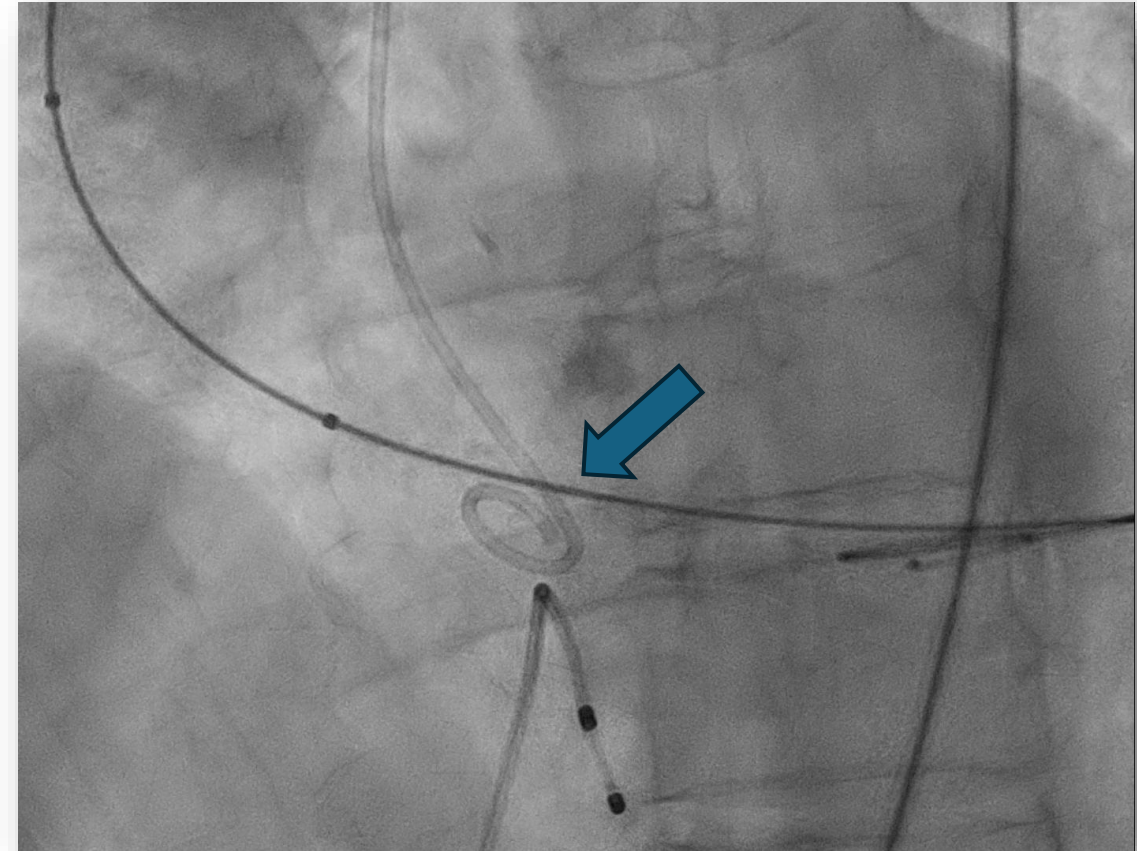
PRÉ DILATAÇÃO

- Facilitar a liberação, posicionamento e expansão
- Balão 1/3 subanular: não associado a distúrbios de condução
- Reduz a necessidade de reposicionamento
- SEV: limiar menor e repetir se cintura no balão
- Contra: IAO com instabilidade, Riscos de distúrbios de condução e AVC





* Balloon size < minimum annulus diameter should not be considered an effective predilatation, but can be used to facilitate crossing the valve



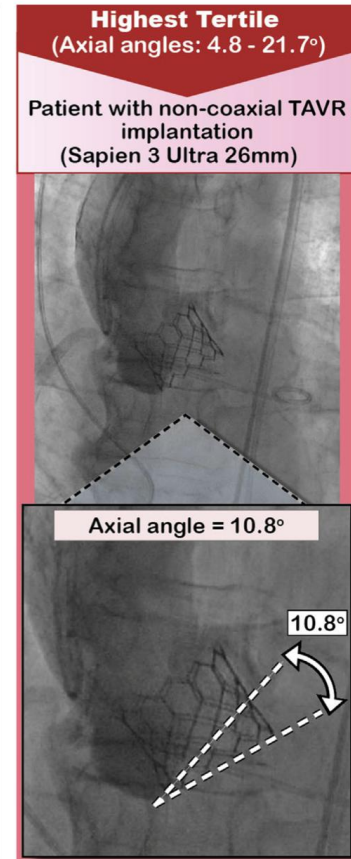
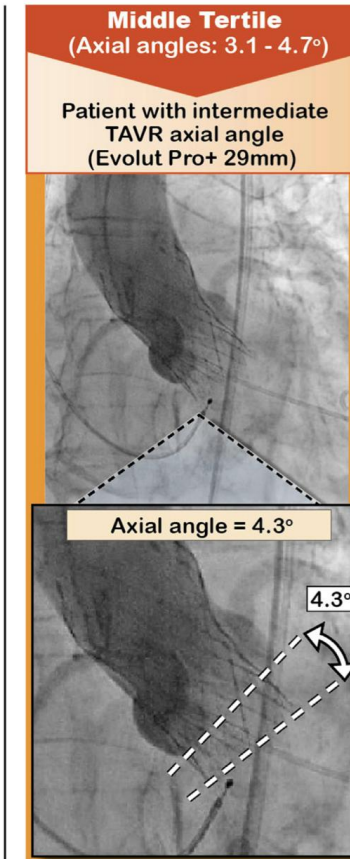
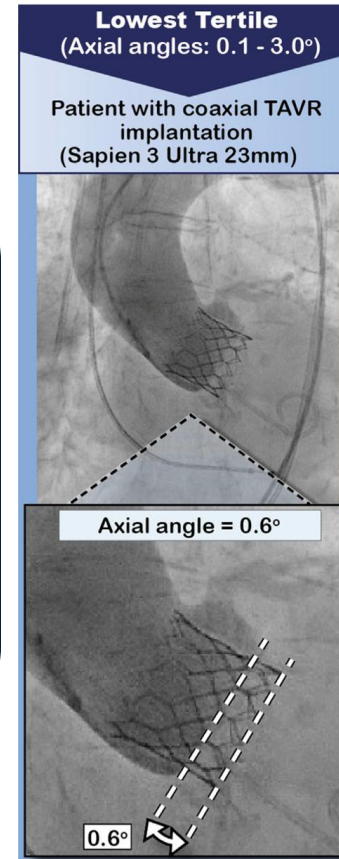
COAXIALIDADE

Preditores

Raiz aórtica dilatada
Raiz aórtica horizontal
Angulação e curvatura
SEV
Calcificação

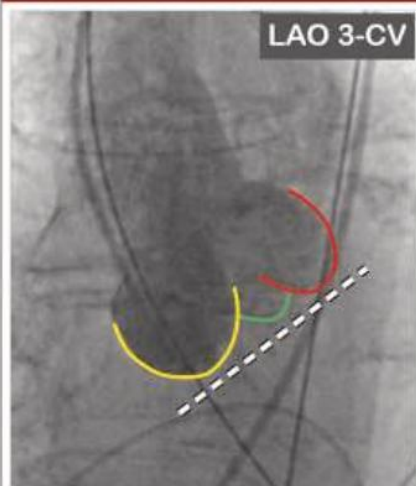
Não coaxialidade

Regurgitação paravalvar
MP
Falha do dispositivo
Risco de obstrução coronária
Fluxo turbulento e Estase
Mortalidade

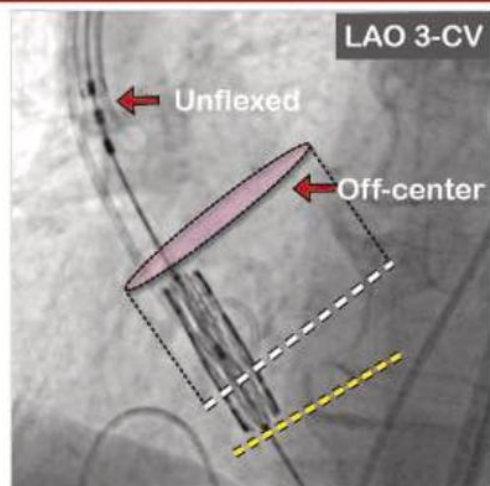


Impact of Noncoaxial Transcatheter Aortic Valve Implantation on Clinical Outcomes – JACC - 2025

Achieving Coaxiality by Active Flexing of the BEV Delivery System

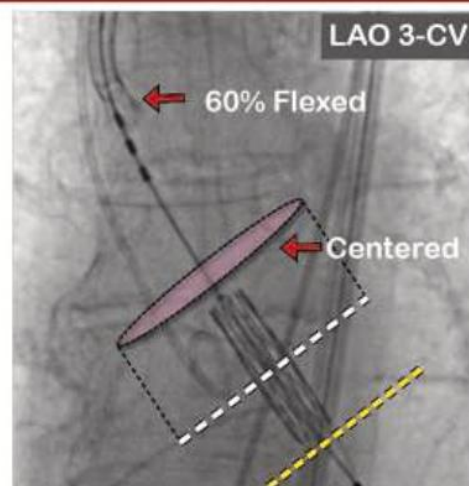


LAO 3-CV



LAO 3-CV

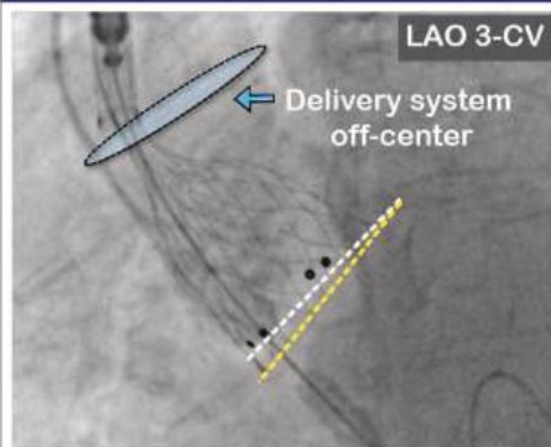
THV is **non-coaxial** with annular plane



LAO 3-CV

THV is **coaxial** with annular plane

Achieving Coaxiality by Manipulating the SEV Delivery System

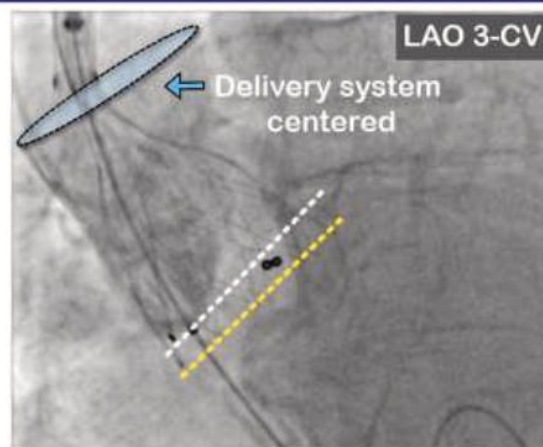


LAO 3-CV

Delivery system off-center

Too high Navitor THV position at LCC in relation to LCC hinge point

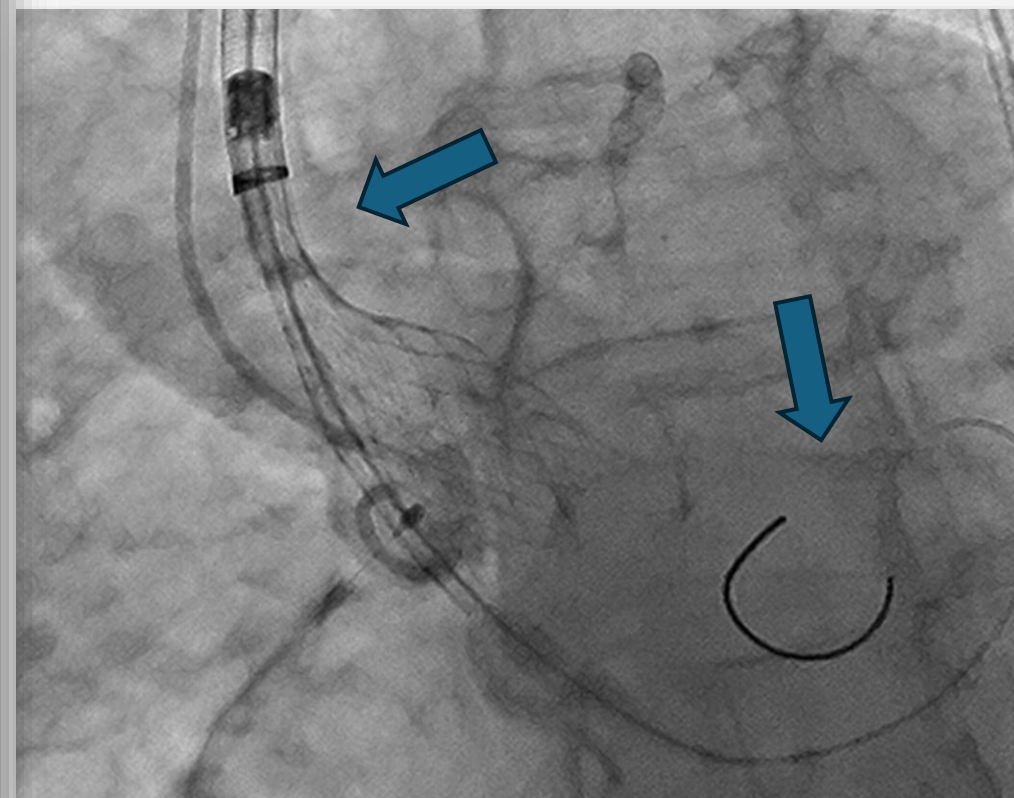
Delivery system is advanced slightly during recapturing & then slightly pulled back on redeployment



LAO 3-CV

Delivery system centered

Deeper Navitor THV position at LCC

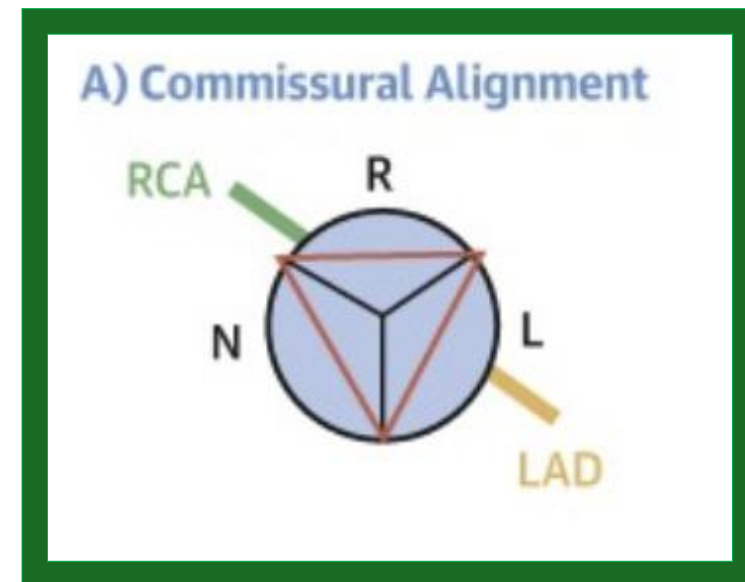


----- Annular plane

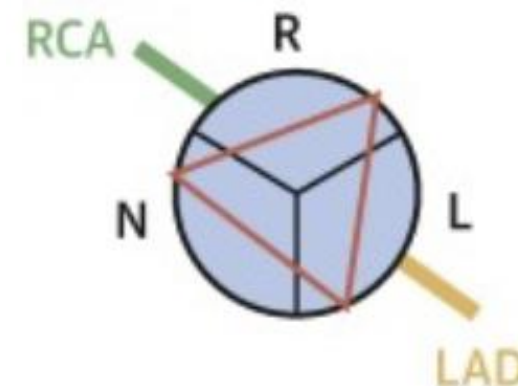
----- THV plane

ORIENTAÇÃO

- Evitar que hastes fiquem a frente das coronárias
- Vantagens: acesso coronário e facilitar *redo*-TAVR
- Bicúspide: podem ter comissura a frente de óstio coronário mesmo com tentativa de alinhamento
- Alinhamento coronário foi proposto como alternativa
 - Ainda há risco: principalmente coronária esquerda
 - Alinhamento comissural permanece como estratégia



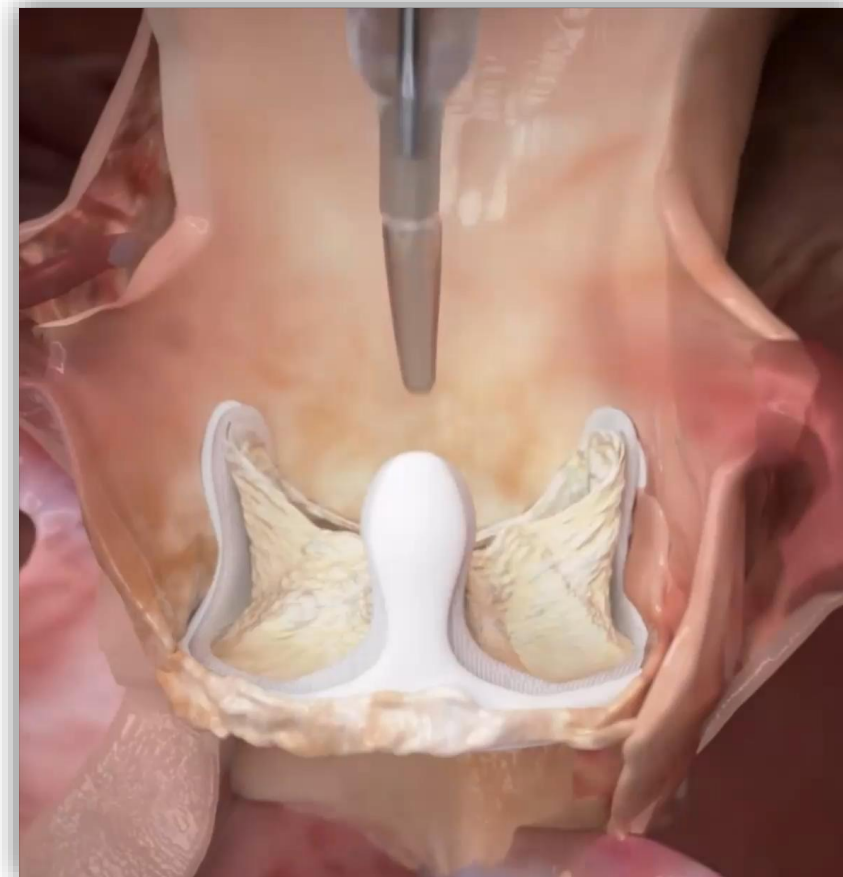
B) Coronary Alignment



Commissural vs Coronary Alignment to Avoid Coronary Overlap With THV-Commissure in TAVR: A CT-Simulation Study - JACC - 2024

ORIENTAÇÃO

- Importância x Anatomia: altura coronariana, dimensões aórticas, DAC e expectativa de vida
- Alinhamento não é possível com todas
- Sucesso do alinhamento comissural:
 - > 90% em Evolut FX+
 - Mais baixo com Navitor
 - Imprevisível com SAPIEN
 - Myval Octacor: *OctaAlign Technique*
- SAPIEN X4: sistema de liberação rotacional



DurAVR (Anteris Technologies)

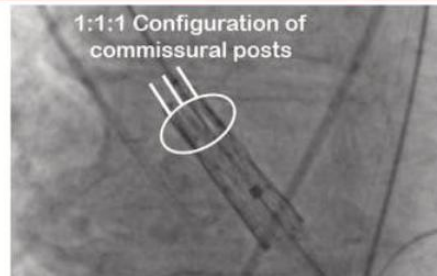


SAPIEN X4

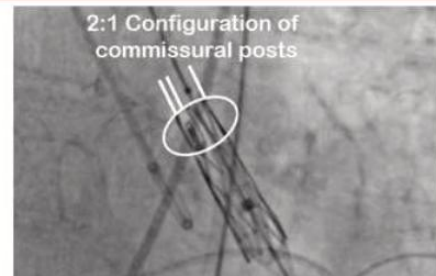


DurAVR (Anteris Technologies)

A Commissural Alignment with a BEV



DurAVR commissurally aligned, in 3-cusp coplanar view



DurAVR commissurally aligned, in R-L cusp overlap view

Non-commissurally aligned posts
3-cusp coplanar view
1:2 Configuration



Commissurally aligned posts
3-cusp coplanar view

Non-commissurally aligned posts
3-cusp coplanar view
2:1 Configuration

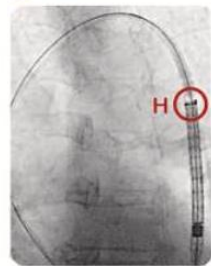


1:1:1 Configuration

B Commissural Alignment with a SEV

1 Evolut FX+ delivery system is inserted with flush port at 3 o'clock (away from the operator)

2 LAO



Delivery system is rotated anticlockwise in descending aorta

Hat marker (H) at outer curve

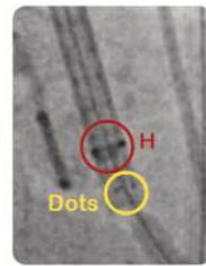
3 LAO



Delivery system is advanced to annulus level

Hat marker at outer curve

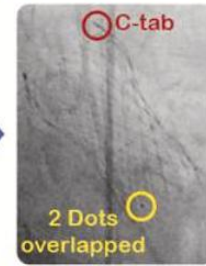
4 R-L Cusp Overlap



2:1 configuration of dots

Hat marker at center front

5 R-L Cusp Overlap



Commissurally aligned Evolut, with 2:1 configuration of dots

C-tab at inner curve

Direcionar o "flush port" em direção oposta ao operador, as 3 horas do relógio

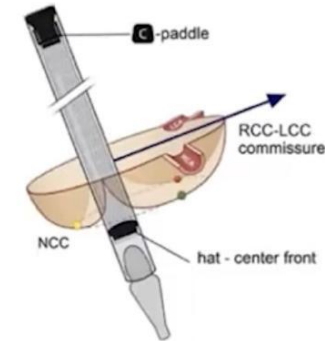
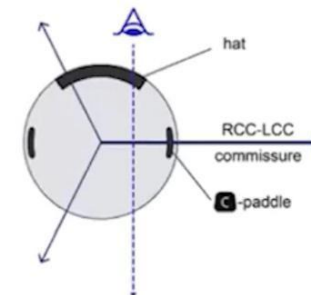


STEP 1. INSERTION

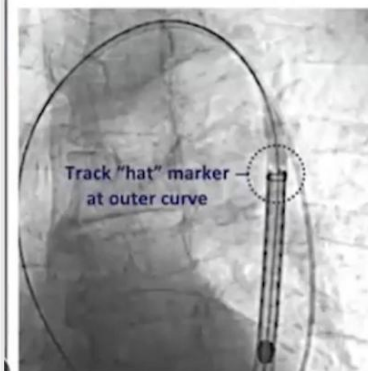


STEP 3. COMMISSURAL ALIGNMENT R-L cusp overlap view

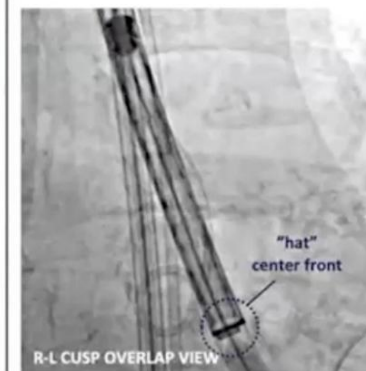
Evolut R/PRO™ in delivery system



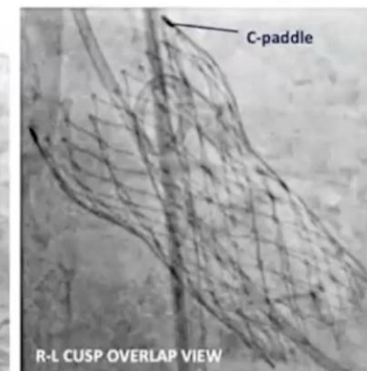
STEP 2. AORTIC ARCH



PRE-DEPLOYMENT



POST-DEPLOYMENT

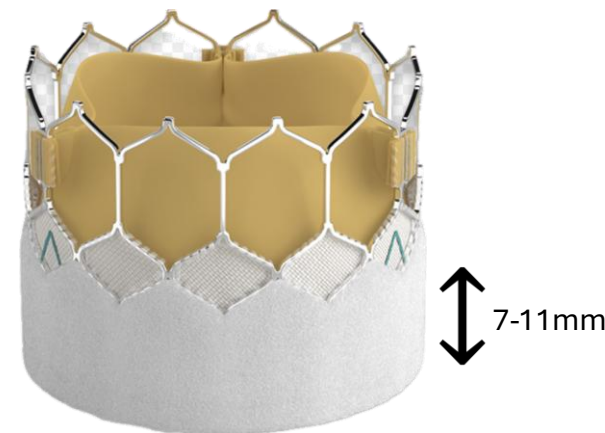
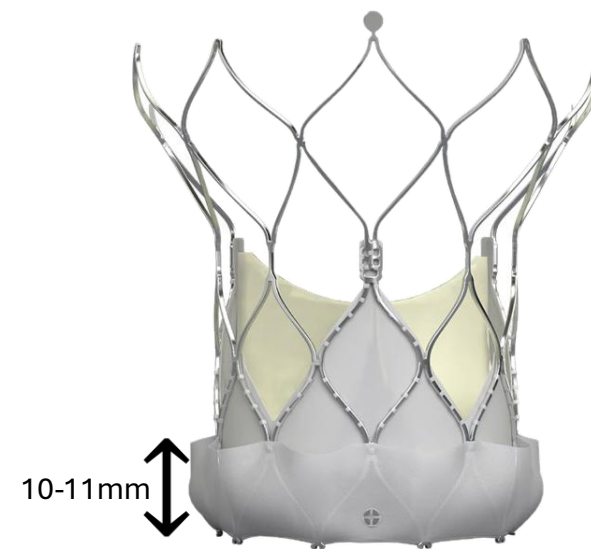
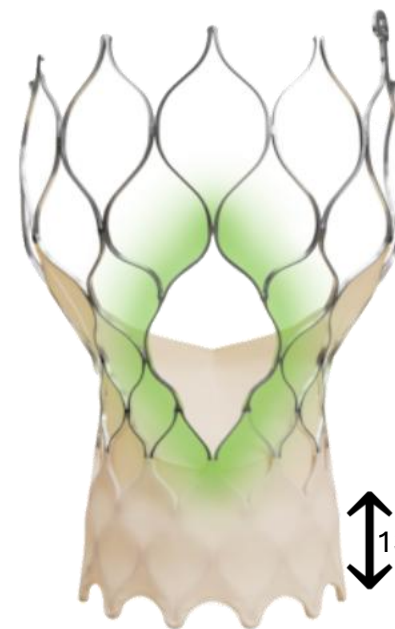


R-L CUSP OVERLAP VIEW

R-L CUSP OVERLAP VIEW

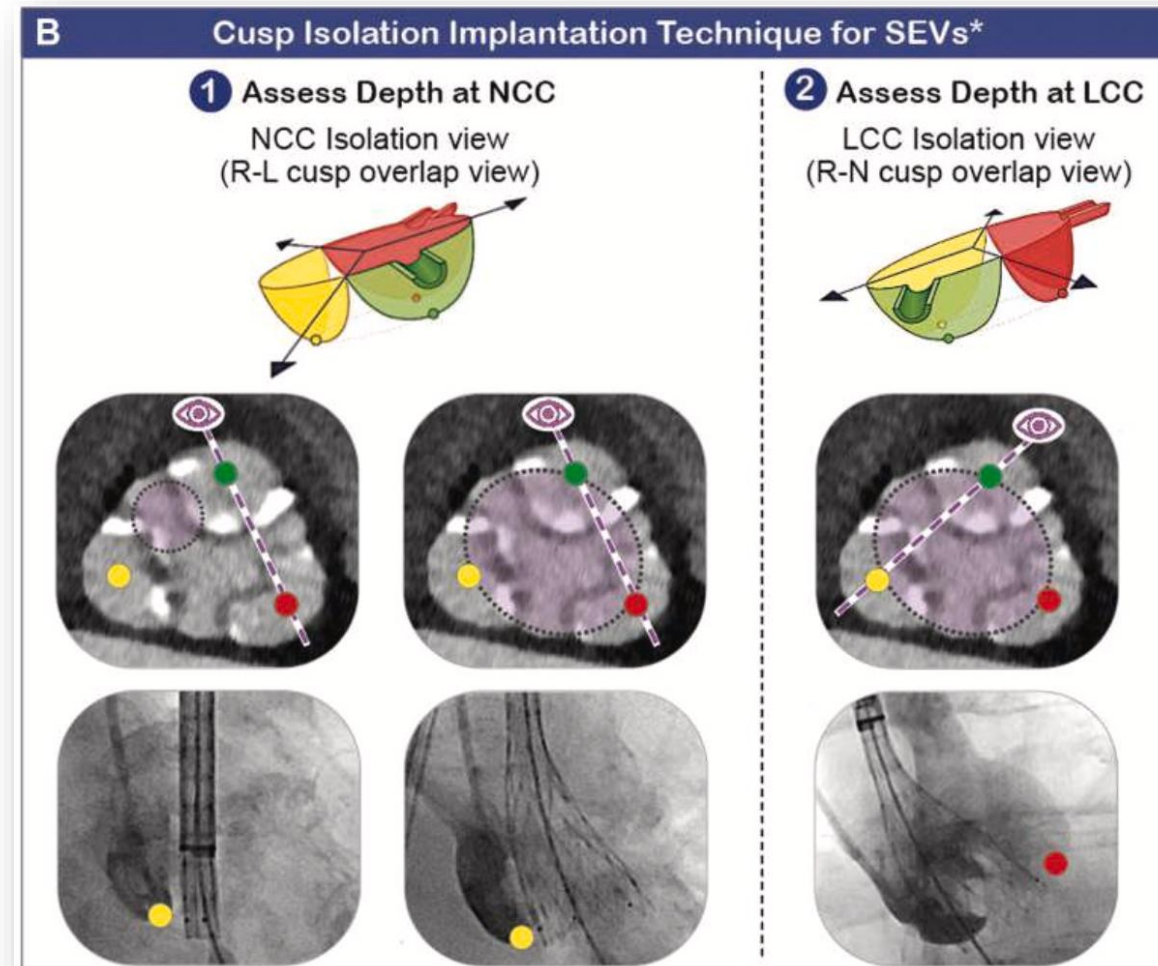
PROFUNDIDADE DE IMPLANTE

- Ancoragem, vedação, hemodinâmica favorável e minimizar distúrbios de condução
- Anel: mais estreita e útil no dimensionamento e referência de profundidade
- Bicúspides: mais estreito supra anular, em rafe
 - Implante mais alto; *undersizing*
- Septo membranoso: marca distância anel – His
- Se muito alto: risco de embolização e NeoSkirt alta em redo-TAVR

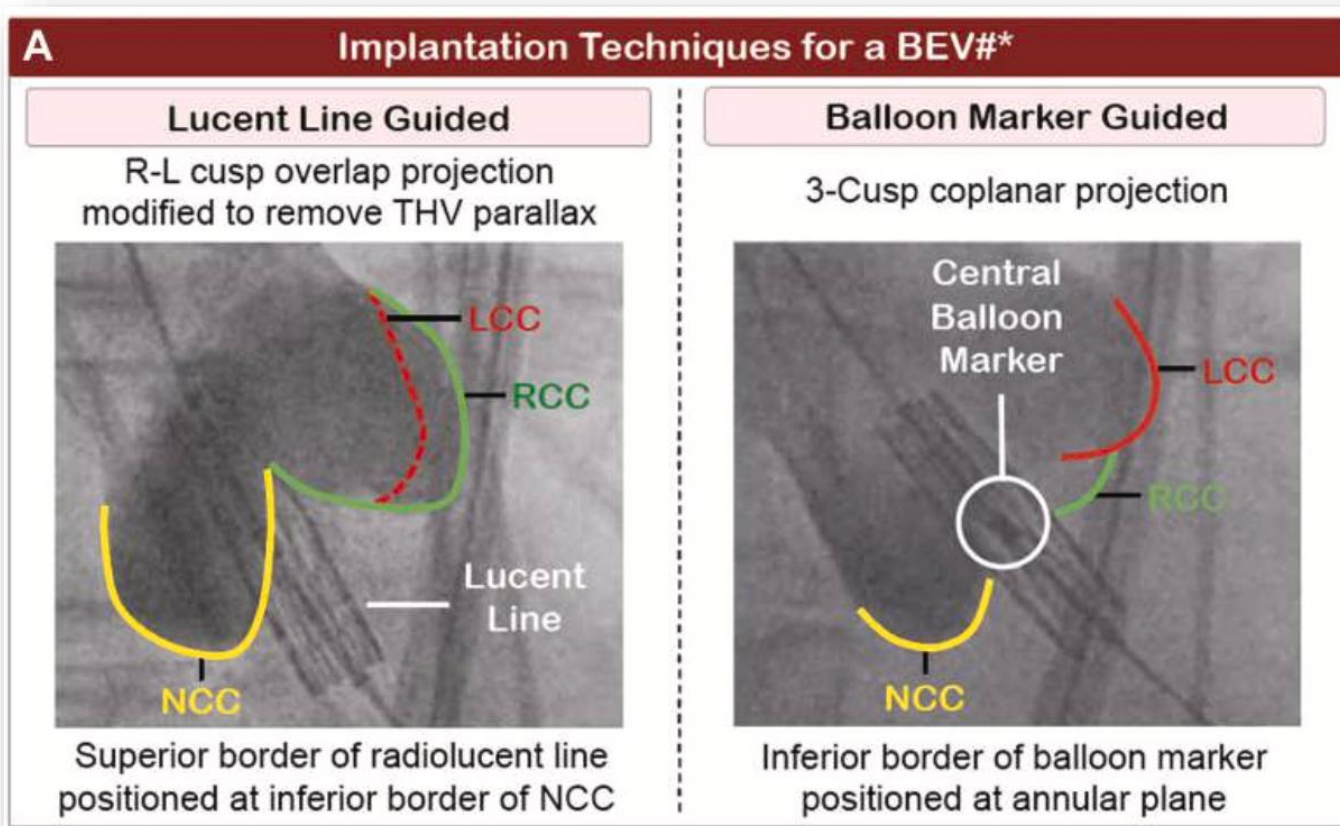


ISOLAMENTO DA CÚSPIDE - POSICIONAMENTO DA SEV

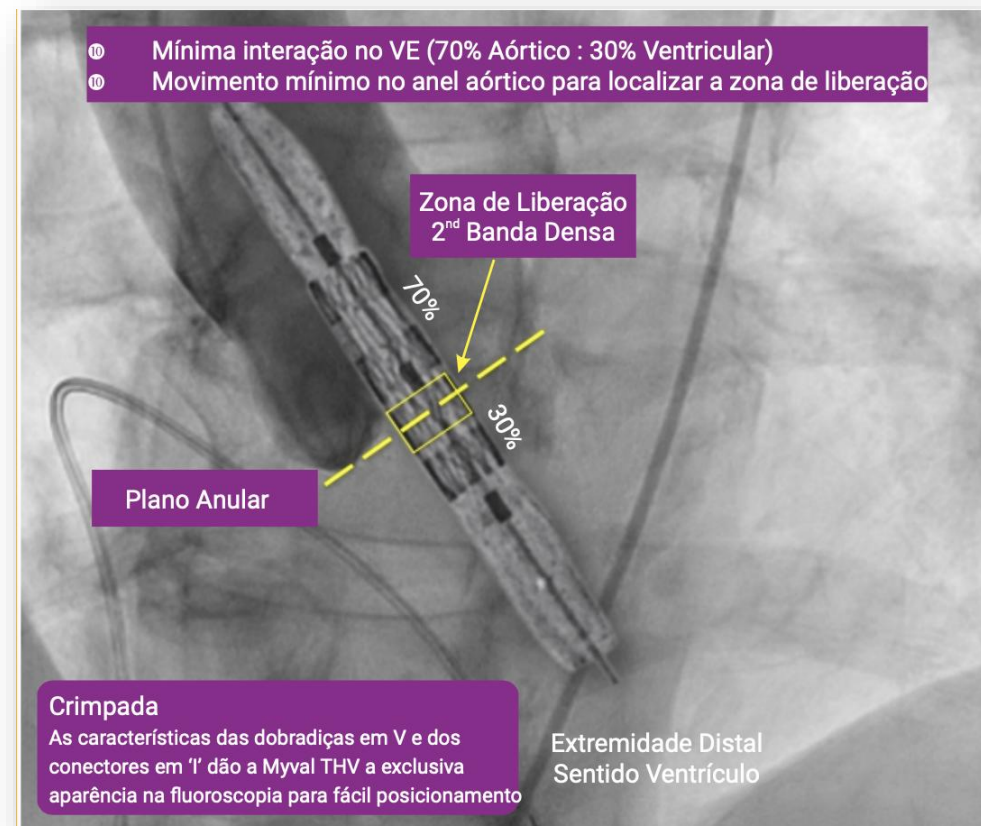
- Implante mais preciso e em posição mais alta
- ↓ MP definitivo
- Avaliar com NCC: **CuspOverlap - OAD Caudal**
- Vantagens:
 - 1) Prótese na comissura RCC-NCC
 - 2) Pigtail na NCC gera referência perfeita
 - 3) Anel nativo e Prótese em mesmo plano
 - 4) Encurtamento mínimo da VSVE
- Após expandir até 80%, avaliar LCC: **OAE**
- Profundidades alvo:
 - Evolut FX +: 1 a 3mm
 - Navitor: 3 a 5mm



LINHA RADIOLÚCIDA - POSICIONAMENTO DA BEV



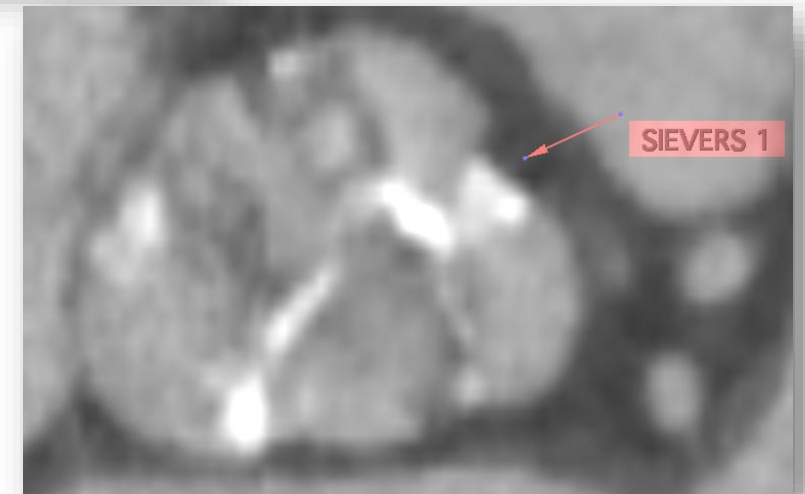
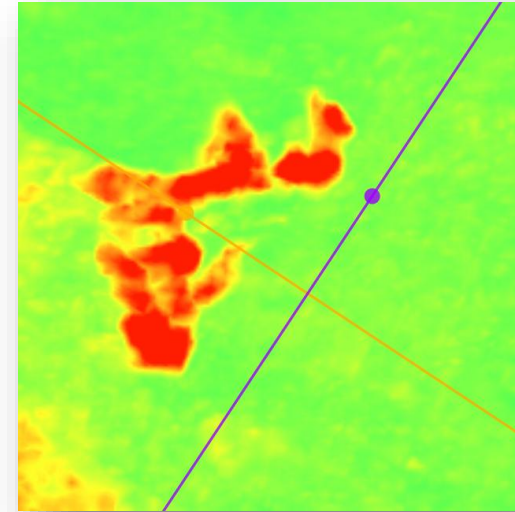
SAPIEN: Linha radiolúcida posicionada ao nível do anel
Implante mais alto



MYVAL: 2ª banda radiodensa ao nível do anel

PREDITORES DE SUBEXPANSÃO

- Calcificação grave no complexo valvar
- Anatomia Bicúspide
- Omissão da pós dilatação
- *Oversizing* Excessivo
- Estrutura de Cromo-Cobalto das BEV



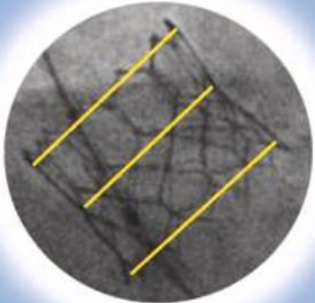
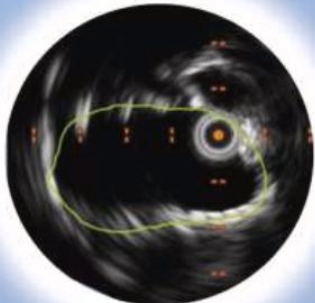
EXPANSÃO

- TC pós TAVI: reservada para disfunção/trombose valvar e se redo-TAVR
- **Fluoroscopia, ECO TE e IVUS** podem ser usados
- Intraprocedimento e orientar a pós dilatação
- Fluoroscopia: de rotina; 2 projeções ortogonais (OAD e OAE)
 - OAD: melhor para avaliar subexpansão
 - OAE: melhor em bicúspides
- ECO TE: pode ser utilizado; requer experiência adicional em imagem

EXPANSÃO

- IVUS
 - Amplo campo de visão
 - Rápido
 - Sem necessidade de sedar e IOT
 - Cateteres não disponíveis na maioria
 - Elevado custo
 - Necessário coaxialidade
 - Precisa de validação

A Modalities for Intraprocedural Evaluation of THV Expansion

Fluoroscopy	IVUS	Transesophageal Echocardiography
		
Two orthogonal views	10Hz EagleEye IVUS catheter	Short-axis view

B Example of Fluoroscopic Evaluation of BEV Expansion

Commissure post for calibration

Outflow

Mid-portion

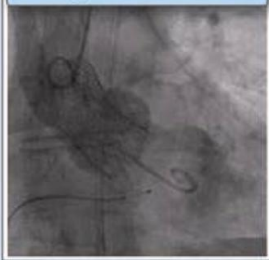
Inflow

THV Expansion (%) = $\left[\frac{\pi \times (\text{THV diameter} \div 2)^2}{\text{Nominal THV area}} \right] \times 100$

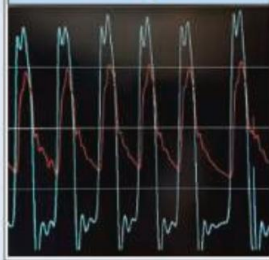
PÓS DILATAÇÃO

Postdilatation recommended

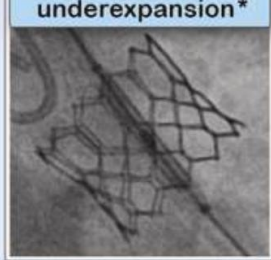
Significant PVL



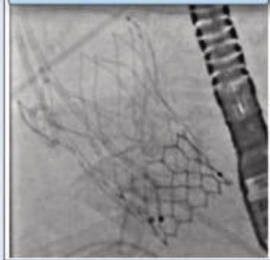
Residual gradient



Valve underexpansion*



Valve-in-valve



*The projection where the THV is most underexpanded can help gauge the need for postdilatation - the projection can be determined by calcium distribution, though tends to be RAO for tricuspid and the commissural view for bicuspid valves

Postdilatation cautions

High risk anatomy for:

- Annulus rupture/ aortic root injury
- Coronary obstruction/ flow compromise

High-degree atrio-ventricular conduction disturbances

- Damage to prosthetic valve leaflets
- Valve embolization/ migration

Choice of balloon size**

- Significant calcification at the aortic annulus, LVOT, or STJ
- Severely calcified bicuspid case

N

Evolut SEV

Max balloon sizes recommended by manufacturer

Navitor SEV

NC balloon size based on perimeter/ area-derived diameter

BEV

- Use circle simulation on CT to project virtual balloon sizes, to avoid interaction with calcium
- Consider positioning the balloon deep or high to avoid interaction with calcium at STJ or LVOT respectively

**Never exceed mean perimeter-derived (or area-derived) diameter

PÓS DILATAÇÃO

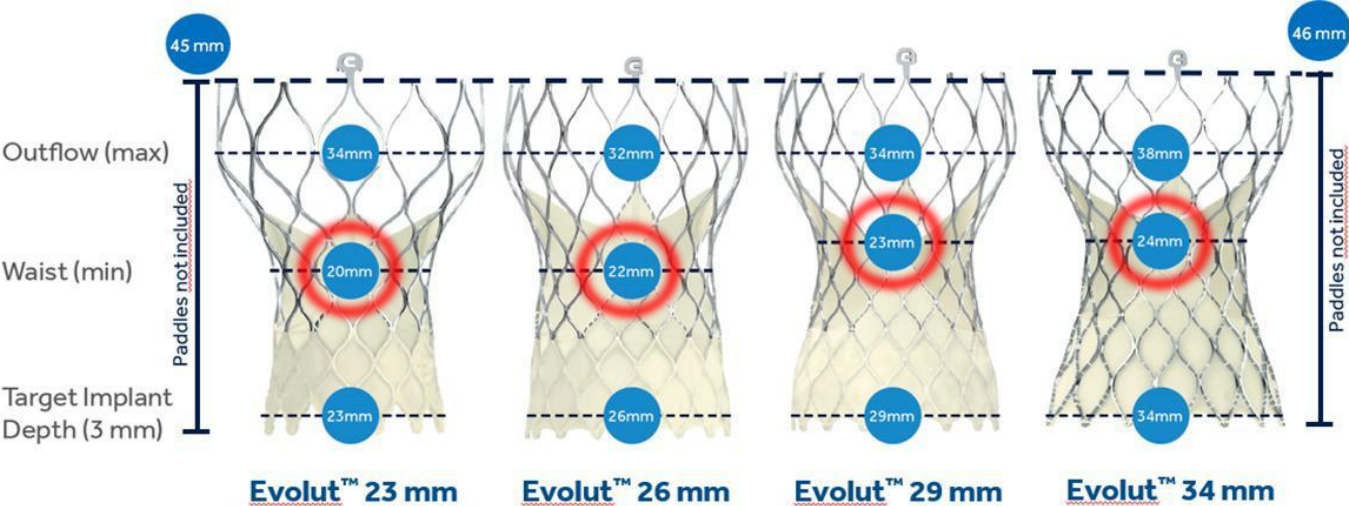
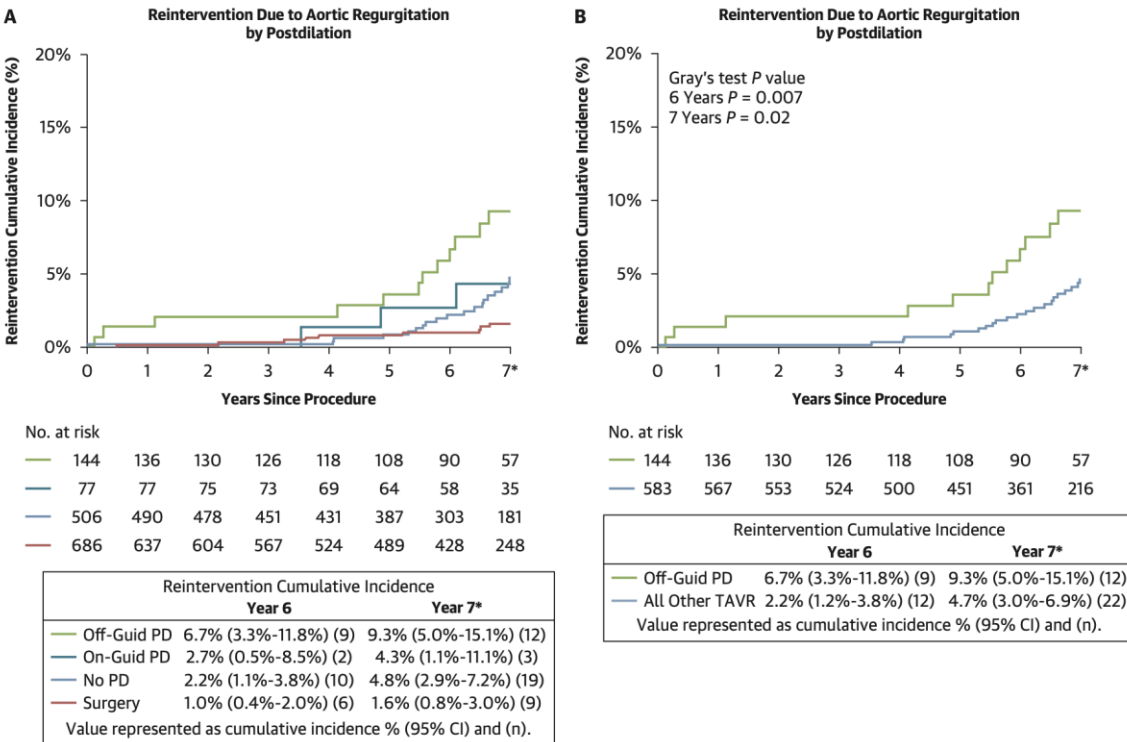


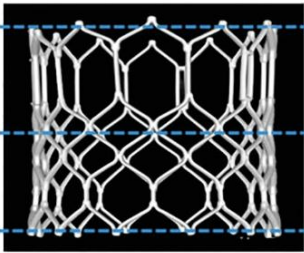
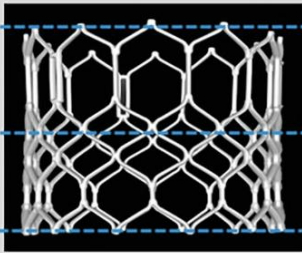
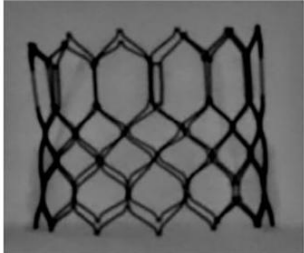
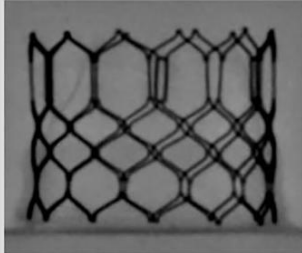
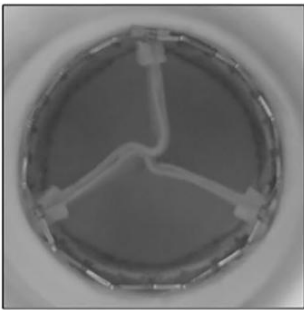
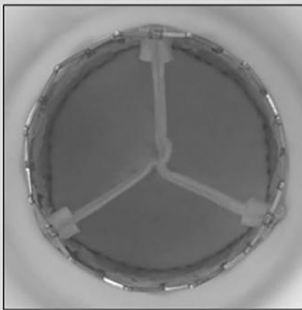
FIGURE 3 Reintervention Caused by Aortic Regurgitation by Postdilation Through 7 Years



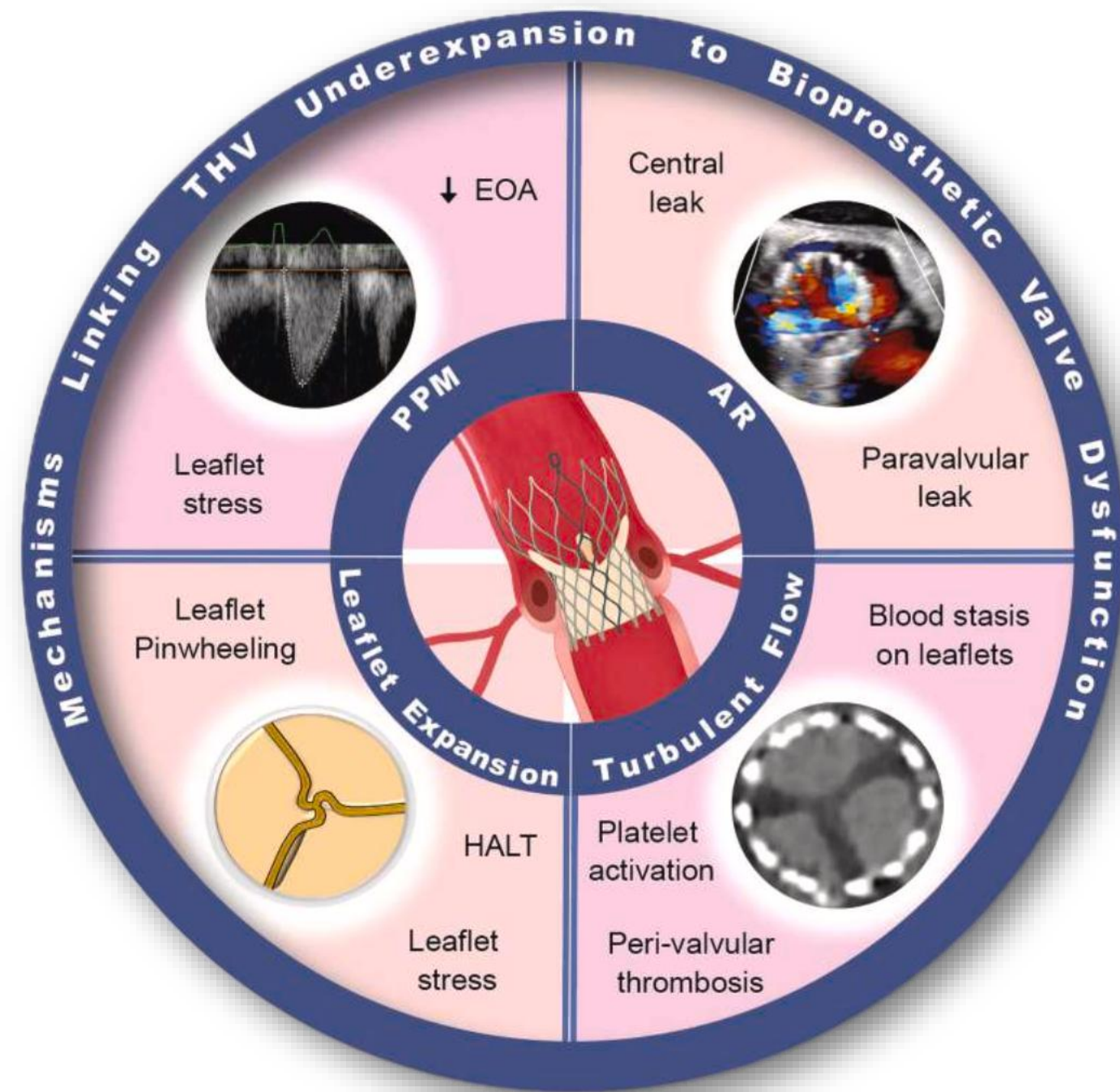
Six-Year Outcomes After Transcatheter vs Surgical Aortic Valve Replacement in Low-Risk Patients With Aortic Stenosis – JACC - 2026

DOUBLE-TAP

- Duplo insuflamento de rotina em BEV: melhor expansão – Fluoroscopia
- Minimiza complicações
- Ganhos: área 9,2% e diâmetro 4,6%
- Maior incremento na porção média
- Ainda incerto se há benefício clínico e se influencia na deterioração
- Estudo ACE DOUBLE: SAPIEN 3 Ultra Resilia: DT rotina x Sem pós dilatação

26 mm SAPIEN 3 Ultra		
	Initial nominal inflation	Double-tap
A	Micro-CT	Micro-CT
	 Outflow 24.4 mm Midpoint 24.0 mm Inflow 24.8 mm Average expansion: 90.1%* Midpoint expansion: 87.2%	 Outflow 25.6 mm Midpoint 24.9 mm Inflow 25.7 mm Average expansion: 97.6%* Midpoint expansion: 93.8%
B	Fluoroscopy	Fluoroscopy
		
C	Hydrodynamics	Hydrodynamics
	 Pinwheeling index 14.0% Mean gradient: 7 mmHg Effective orifice area: 2.1 cm²	 Pinwheeling index 4.6% Mean gradient: 7 mmHg Effective orifice area: 2.1 cm²

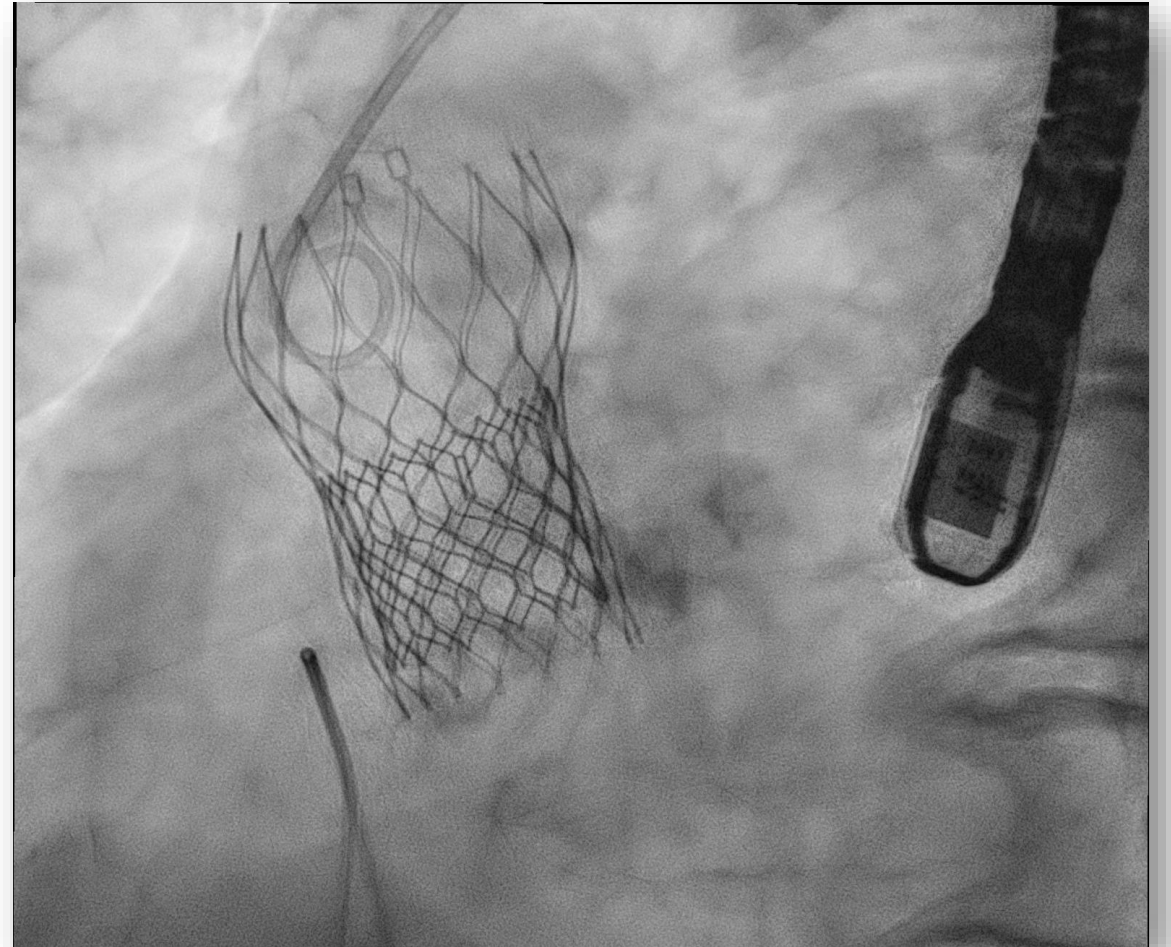
Routine post-dilatation at nominal volume to optimise the expansion of balloon-expandable valves: the DOUBLE-TAP study – EuroIntervention - 2025



DETERIORAÇÃO
HEMODINÂMICA DA
PRÓTESE

SUBEXPANSÃO EM REDO-TAVR

- Limita tamanho da 2 prótese
 - Gradientes maiores
- BEV subexpandida:
 - Fenômeno “*watermelon seeding*”
- TC após redo-TAVR:
 - Subexpansão das 2



DIREÇÕES FUTURAS

PADRÃO DE TRATAMENTO



Preparo da lesão
Posicionamento preciso
Imagem Intravascular
Pós dilatação

DESIGNS INOVADORES

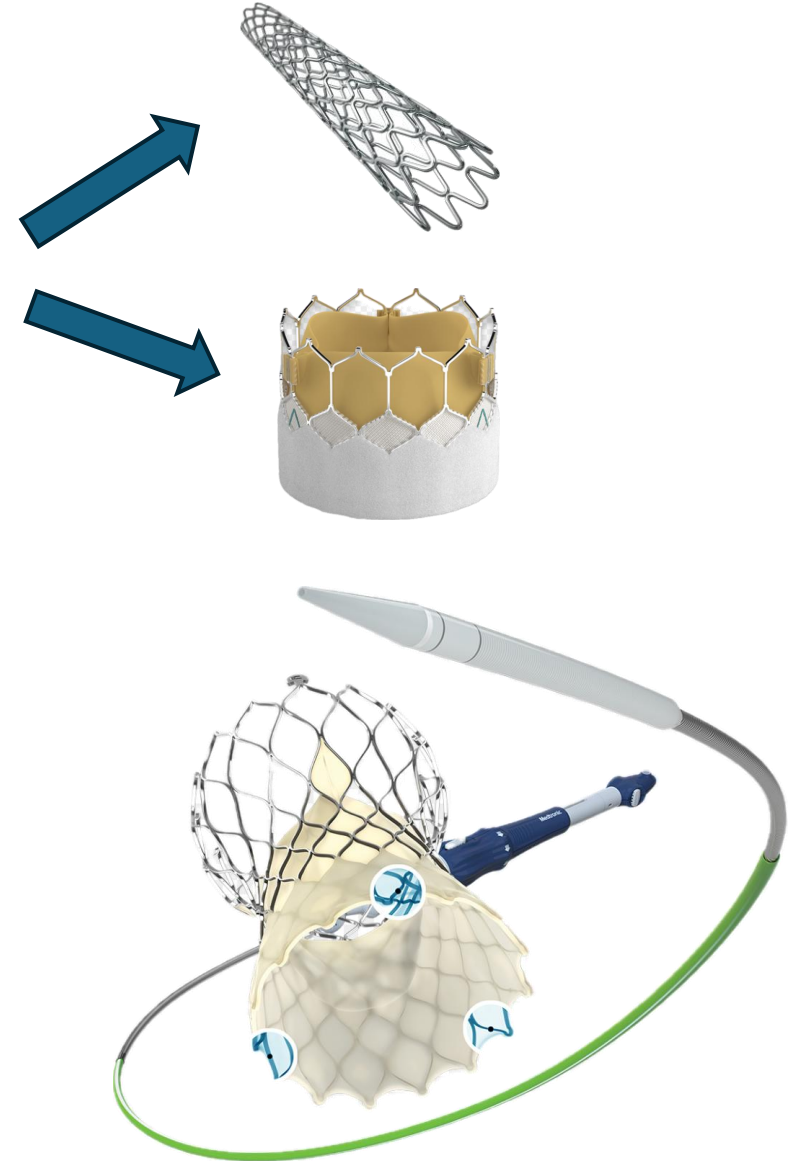


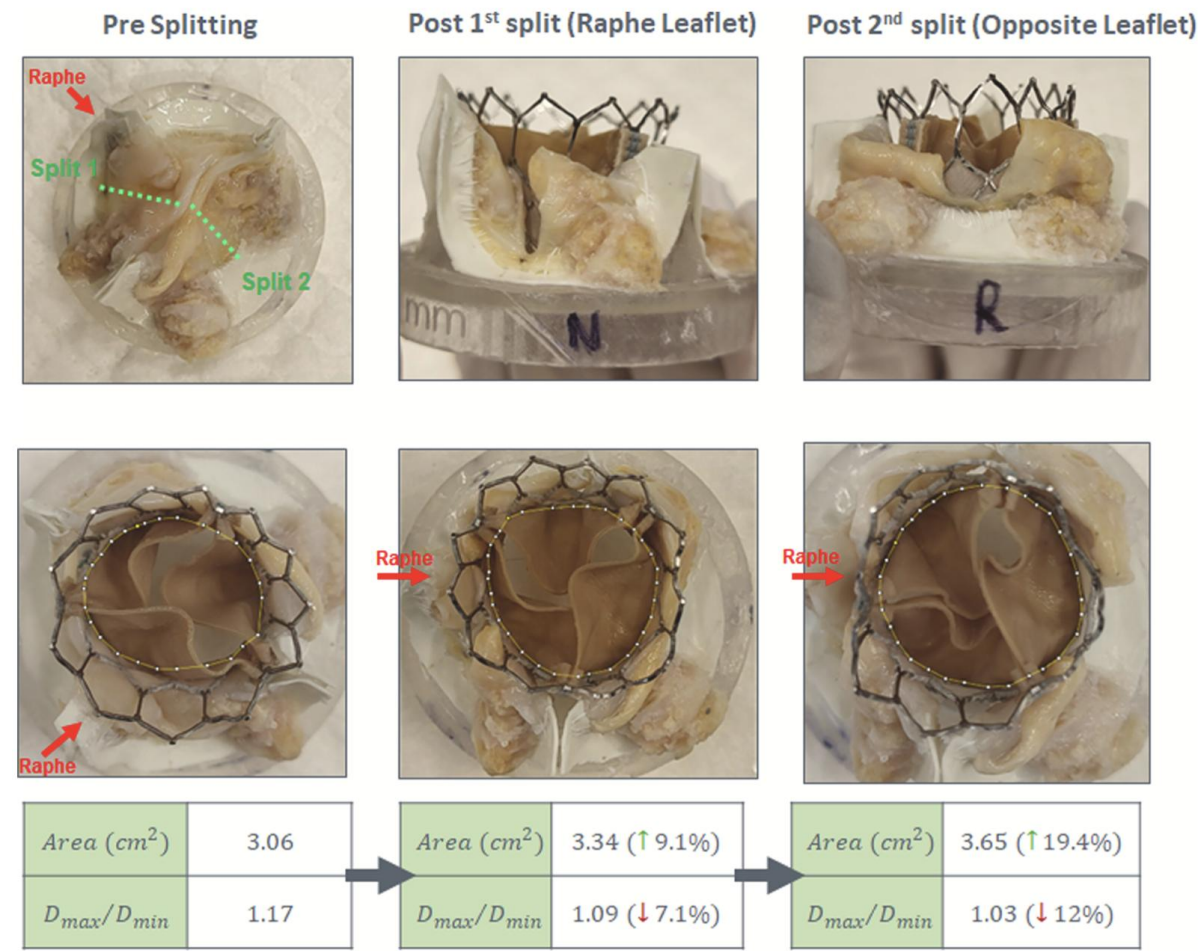
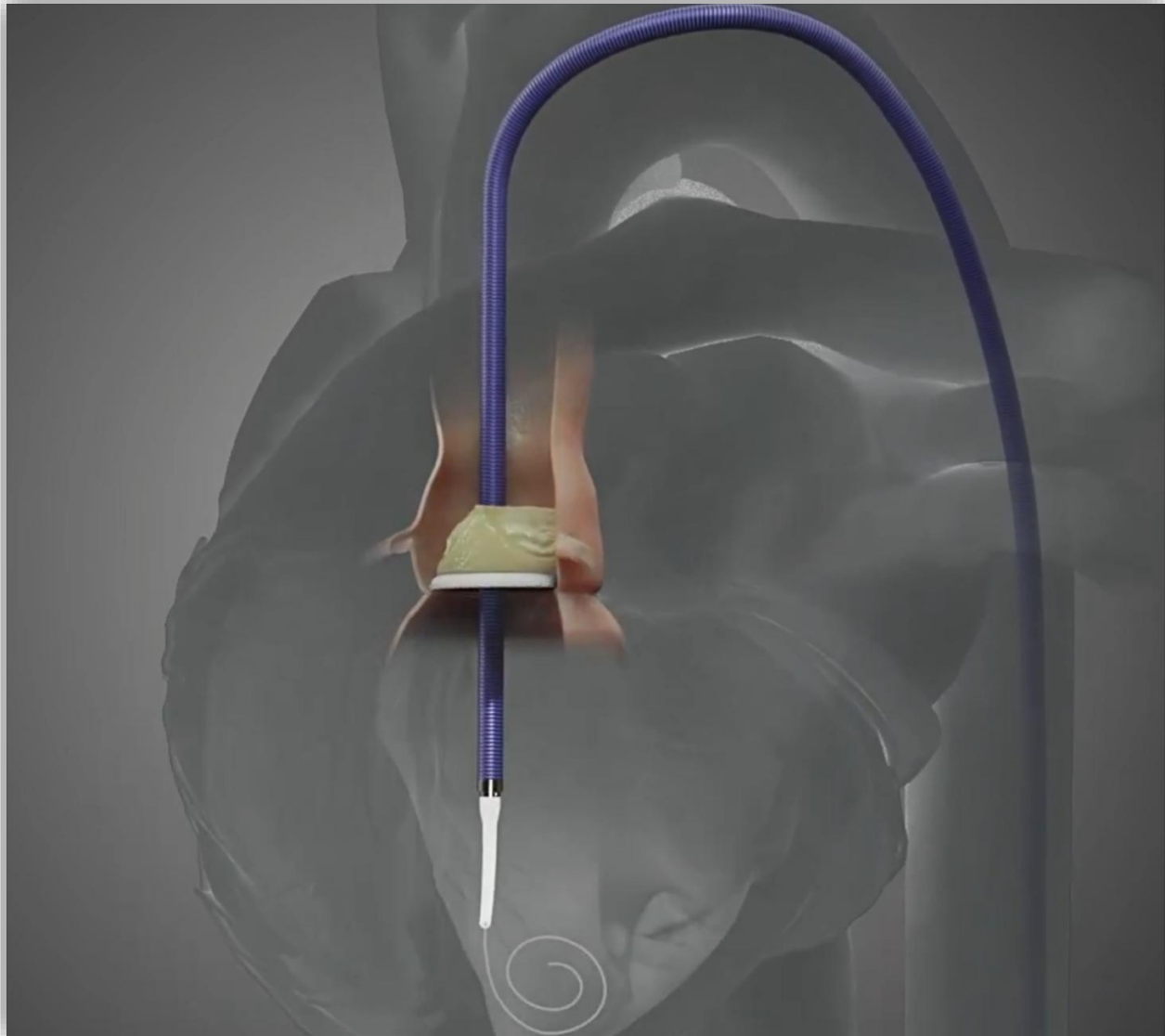
Expansão simétrica
Melhor visualização
Sistemas de entrega rotacionais

IA



Orientação do implante
Fluoroscopia 3D
Seleção automática de projeção





Bicuspid Aortic Valve Leaflet Modification Before Transcatheter Aortic Valve Replacement – JACC - 2026

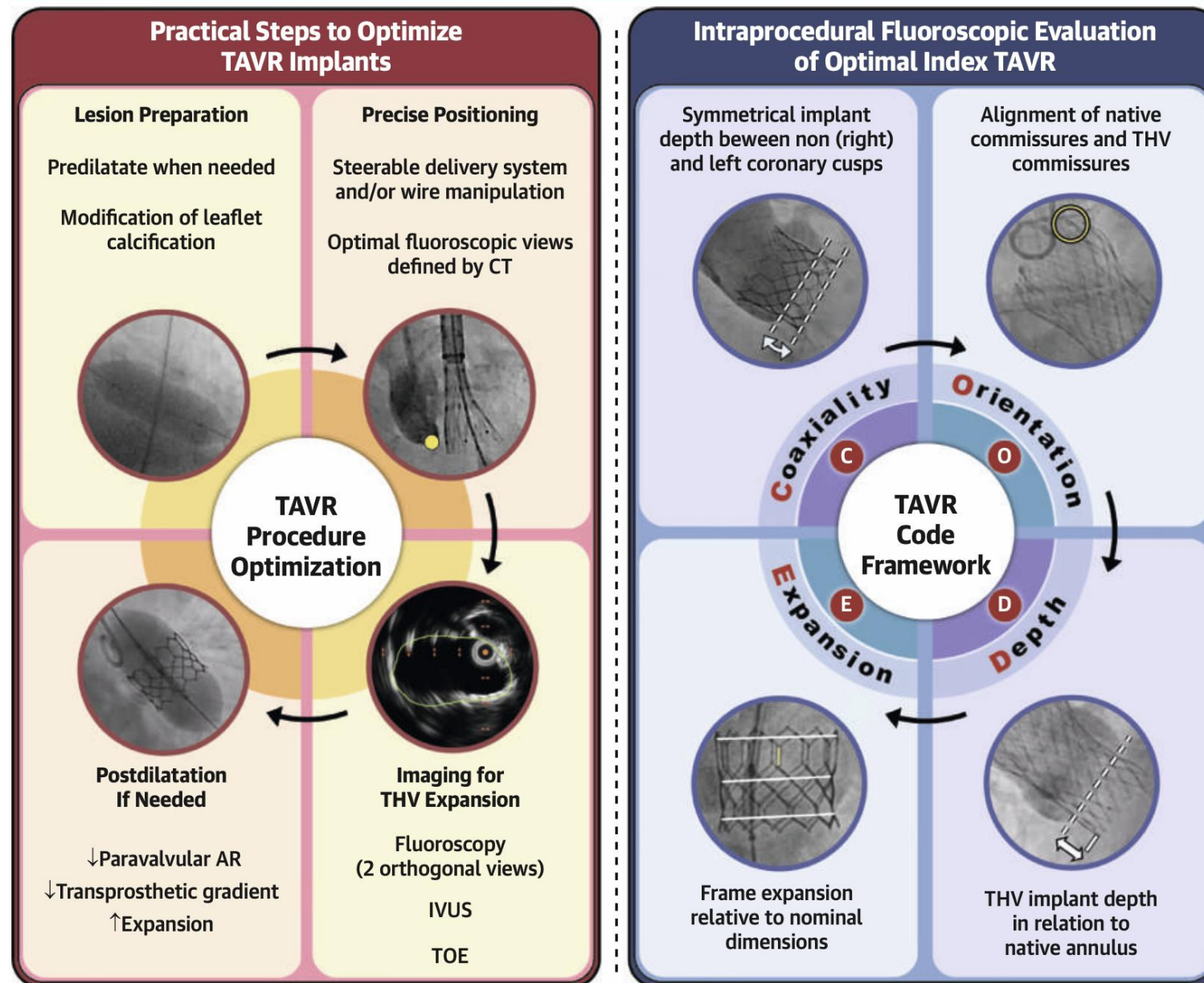
CONCLUSÃO

Orientações e perspectiva especializada para apoiar o procedimento inicial ideal de TAVR.

Sistematização das estratégias: melhora os desfechos clínicos e relacionados ao dispositivo.

Entretanto, necessários dados de longo prazo para a avaliação prospectiva das técnicas de otimização.

TAVR CODE Framework (Coaxiality, Orientation, Depth, and Expansion), and Procedural Strategies



PRÓTESE	PERICÁRDIO	POSIÇÃO	LIBERAÇÃO	METAL	REPOSICIONÁVEL
SAPIEN 3/ULTRA (Edwards)	BOVINO	INTRA- ANELAR	BALÃO- EXPANSÍVEL	CROMO- COBALTO	NÃO
MYVAL (Meril)	BOVINO	INTRA- ANELAR	BALÃO- EXPANSÍVEL	COBALTO	NÃO
SAFESYNC (Braile)	BOVINO	INTRA- ANELAR	BALÃO- EXPANSÍVEL	CROMO- COBALTO	NÃO
EVOLUT PRO + /FX (Medtronic)	PORCINO	SUPRA- ANELAR	AUTO- EXPANSÍVEL	NITINOL	SIM
VITAFLOW LIBERTY (Microport)	BOVINO	SUPRA- ANELAR	AUTO- EXPANSÍVEL	NITINOL	SIM
NAVITOR (Abbott)	BOVINO (FOLHETOS) PORCINO (SAIA INTERNA)	INTRA- ANELAR	AUTO- EXPANSÍVEL	NITINOL (60%)	SIM
VENUS A - PRO (Venus Medtech)	PORCINO	SUPRA- ANELAR	AUTO- EXPANSÍVEL	NITINOL	SIM