

Choosing the best THV for an Endo-Bentall

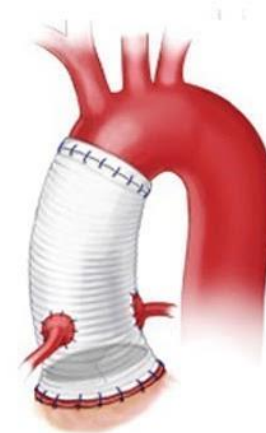
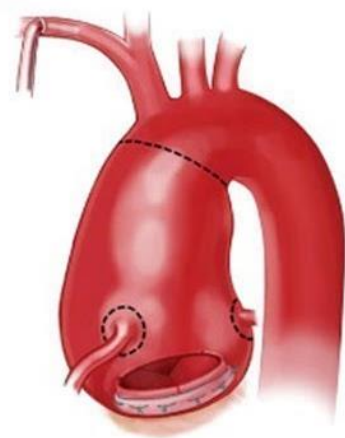
Gintautas Bieliauskas, MD

Copenhagen University Hospital – Rigshospitalet

I have received consulting fees from:

- Abbott
- Metronic
- Boston Scientific
- Edwards Lifesciences

What is the Bentall procedure?

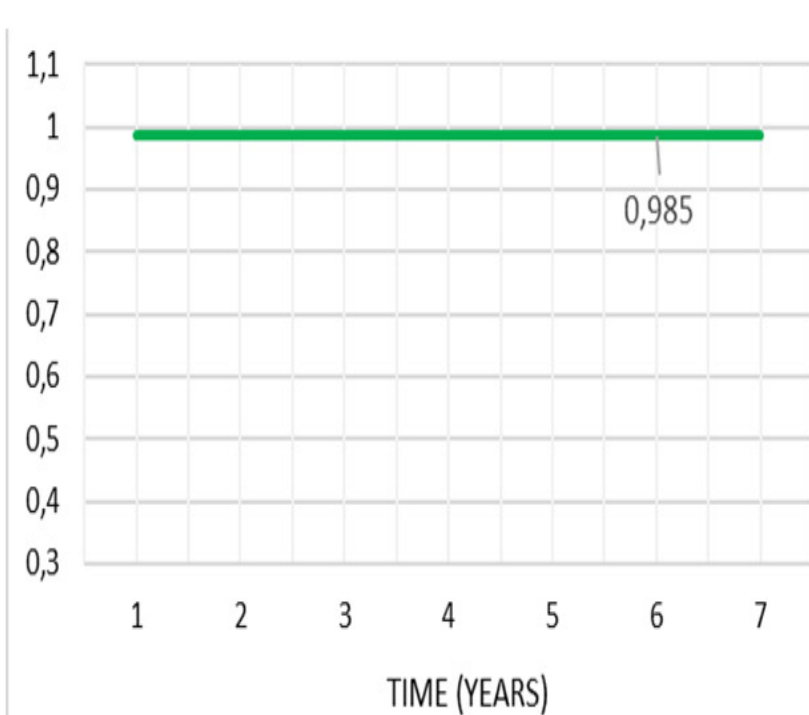


Bentall procedure is a type of cardiac surgery

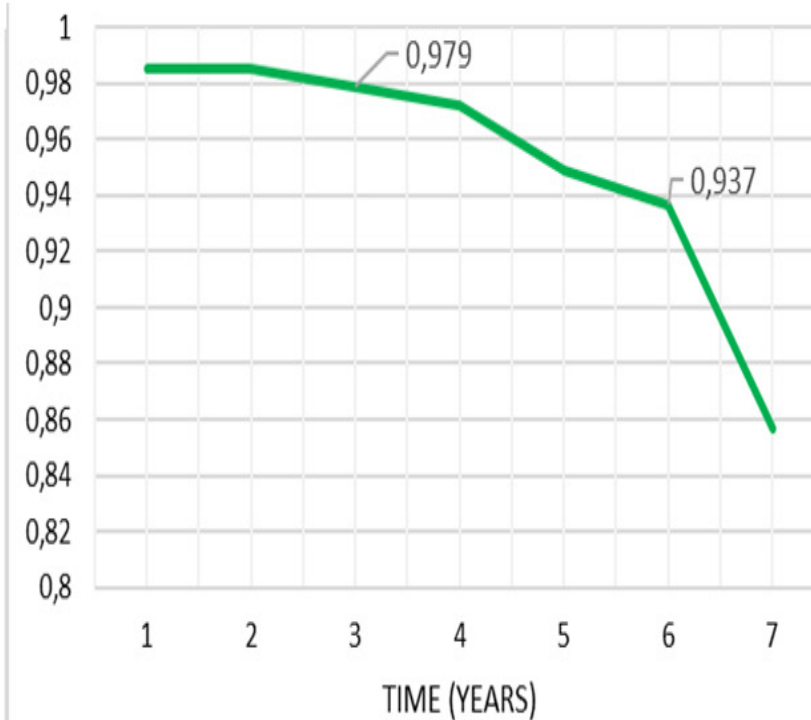
- Composite graft replacement of aortic valve/root/ascending aorta
- Reimplantation of the coronary arteries into the graft
- To treat combined pathology of aortic valve and ascending aorta
- First described by Hugh Bentall and Antony de Bono in 1968

Survival rate for the Bentall procedure?

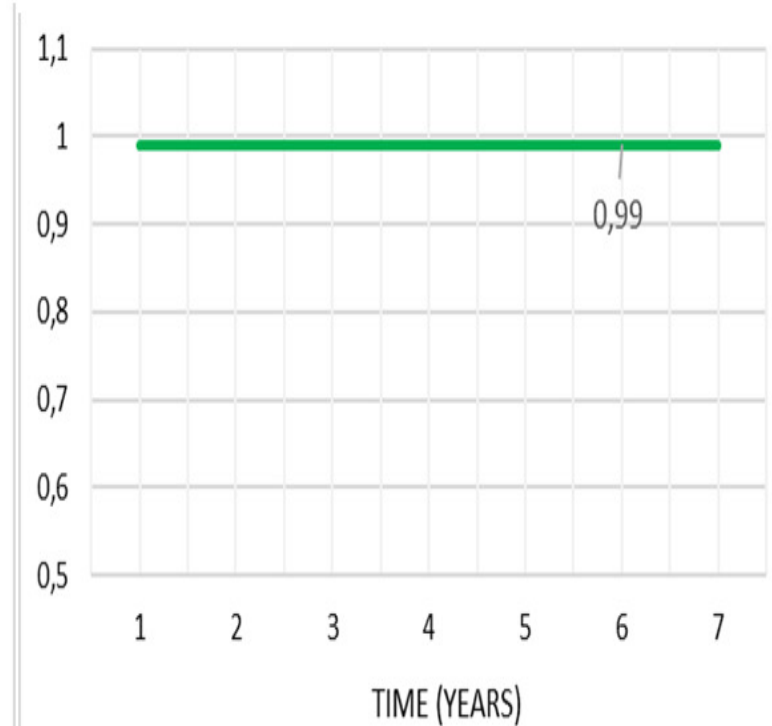
Cardiac Death



Endocarditis - Redo operation



Stroke





Article

Bentall Operation: Early Surgical Results, Seven-Year Outcomes, and Risk Factors Analysis

Paolo Nardi ^{1,*} , Calogera Pisano ¹ , Carlo Bassano ¹ , Fabio Bertoldo ¹, Alessandro Cristian Salvati ¹,
Dario Buioni ¹, Daniele Trombetti ¹, Laura Asta ¹, Mattia Scognamiglio ¹, Claudia Altieri ² and Giovanni Ruvolo ¹

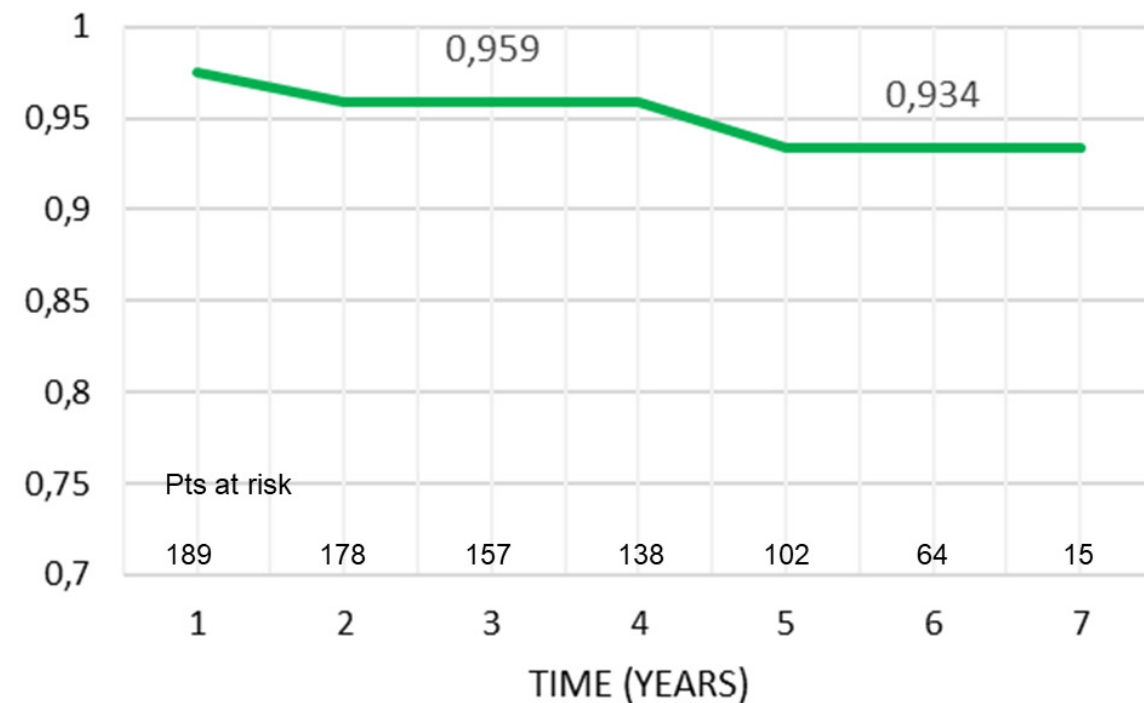
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Bentall procedure outcomes

- 217 patients treated between 2015 and 2021
- Large single-center experience (30 Bentall operations per year)
- Operative mortality was 1.38%
- Survival at 7 years was 93%



Open surgery poses high risk for some pts

Early outcomes of the Bentall procedure after previous cardiac surgery

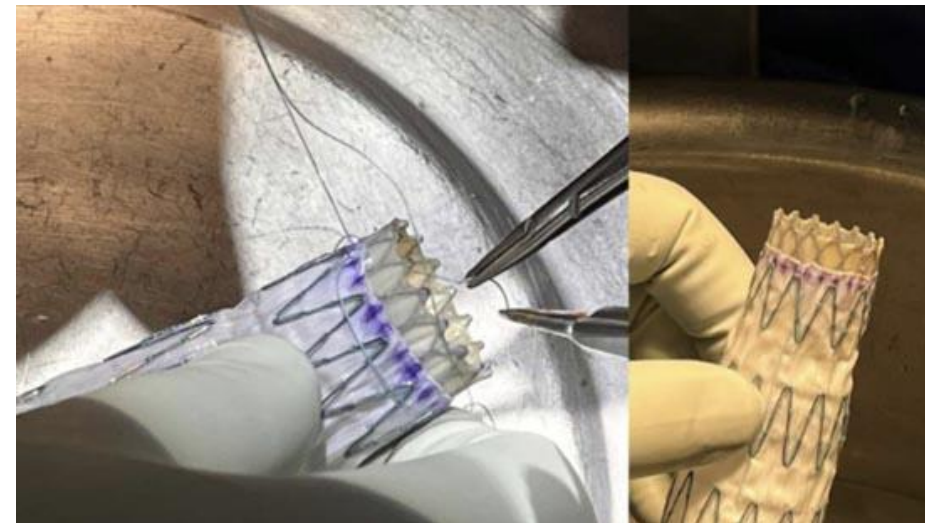
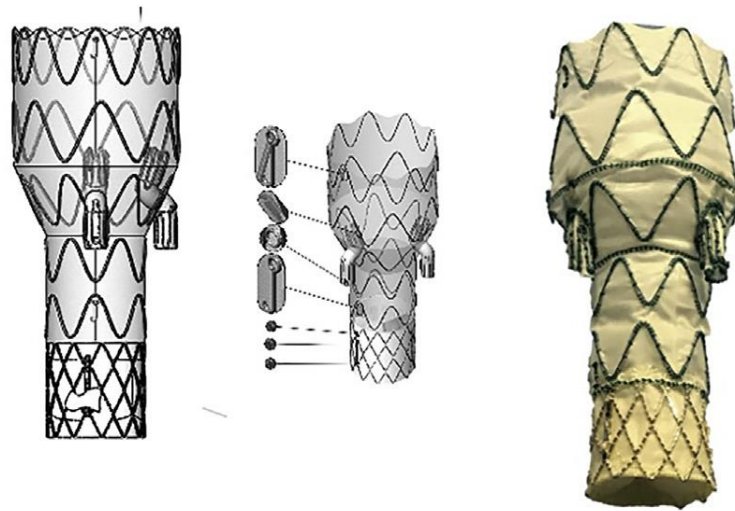
Amine Mazine, MD, MSc, Tirone E. David, MD, Myriam Lafreniere-Roula, PhD, Christopher M. Feindel, MD, and Maral Ouzounian, MD, PhD

Some patients have high risk for open surgery

- Single-center experience
- 473 patients underwent Bentall procedure between 1990 and 2014
- All of these patients had cardiac surgery prior to Bentall procedure
- The composite of major morbidity and operative mortality was 32%
- 30-day mortality was 7,8%

Clinical need for a less invasive option?

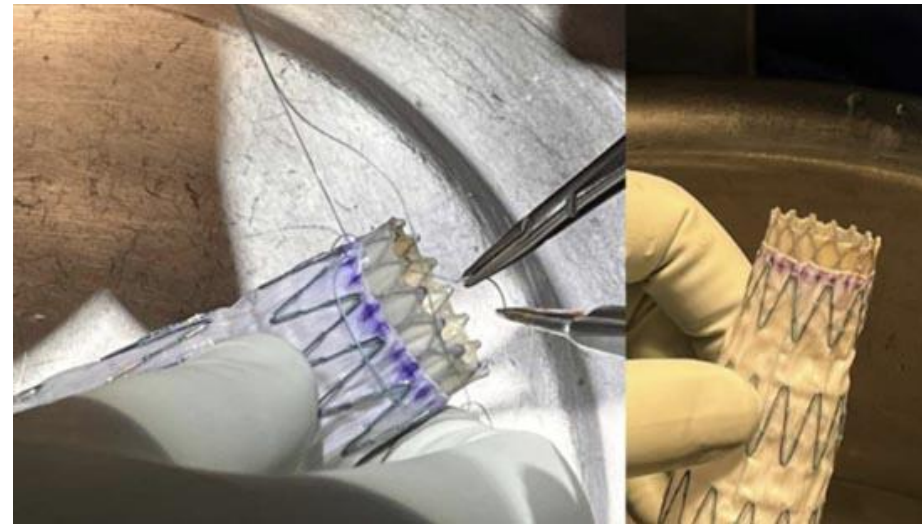
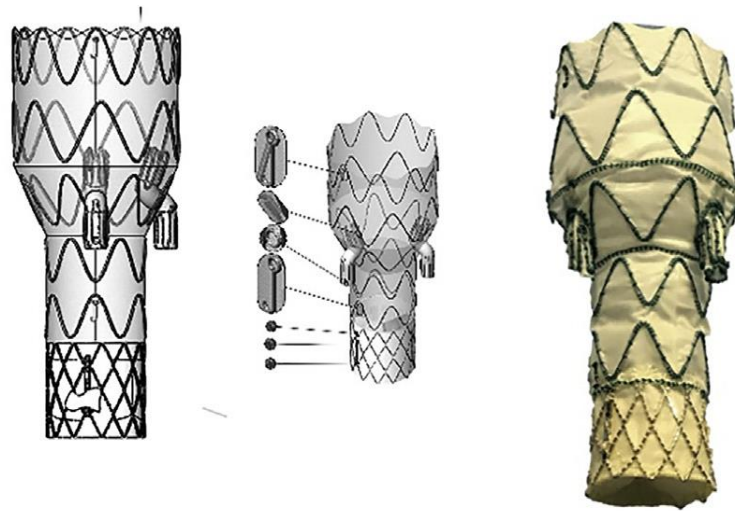
Concept of the Endo-Bentall procedure



Endo-Bentall is an endovascular intervention

- Repair of aortic valve/root/ascending aorta using endovascular means
- Combination of **THV (TAVI)** and **fenestrated aortic stentgraft (TEVAR)**
- Bridging stents to connect coronary arteries with the endograft
- To treat combined pathology of aortic valve and ascending aorta
- First described by Diego F. Gaia et al in **2020**

Different ways to perform Endo-Bental procedure



Endo-Bentall concept #1

JACC: CASE REPORTS

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VOL. 2, NO. 3, 2020

CASE REPORT

ADVANCED

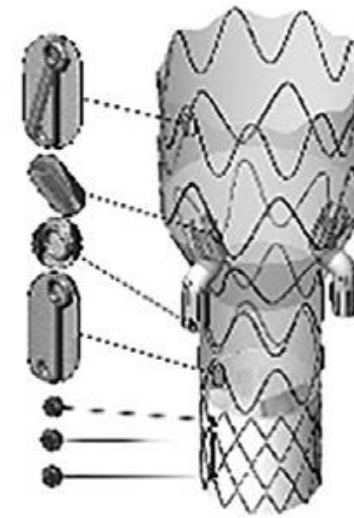
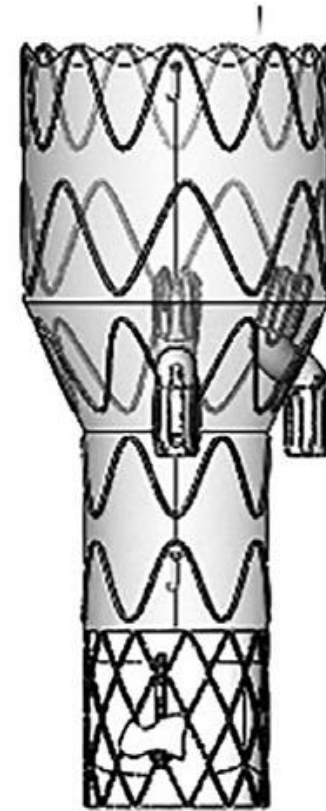
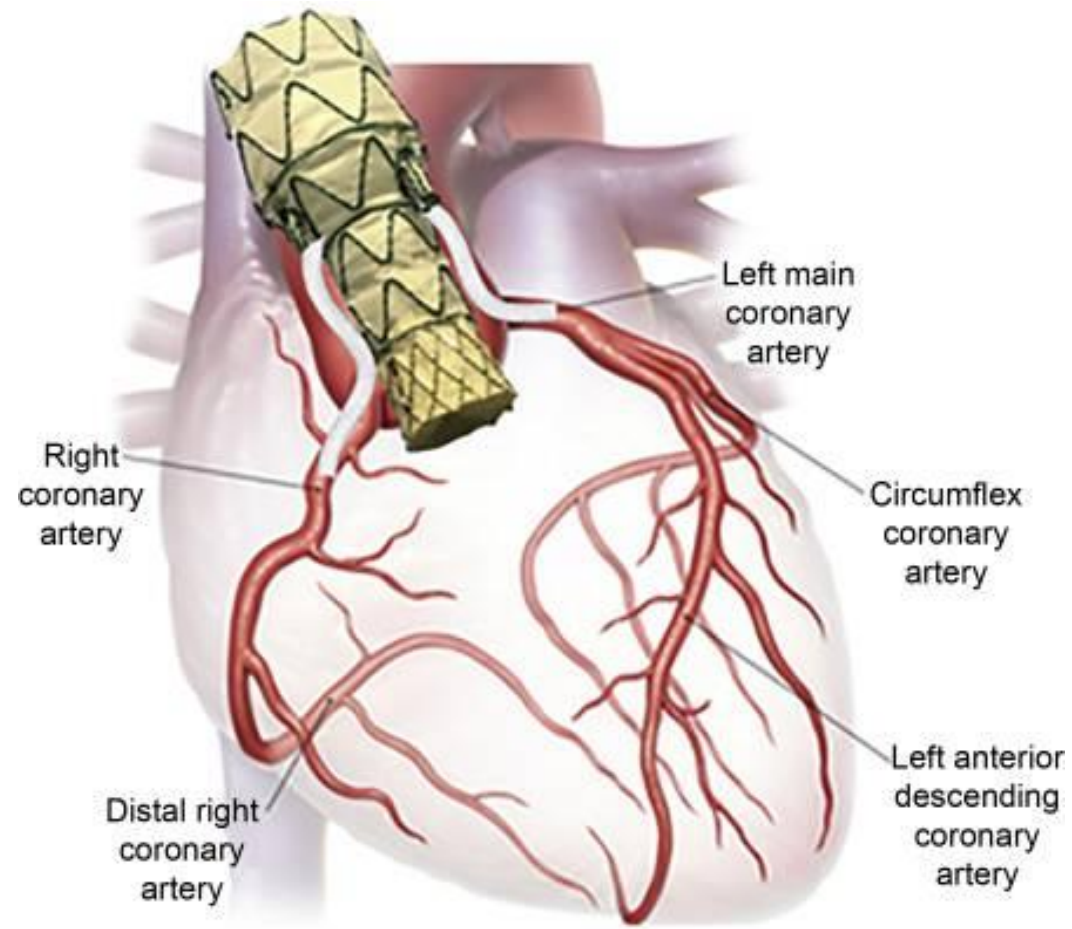
CLINICAL CASE: FIRST IN HUMAN

First-in-Human Endo-Bentall Procedure for Simultaneous Treatment of the Ascending Aorta and Aortic Valve



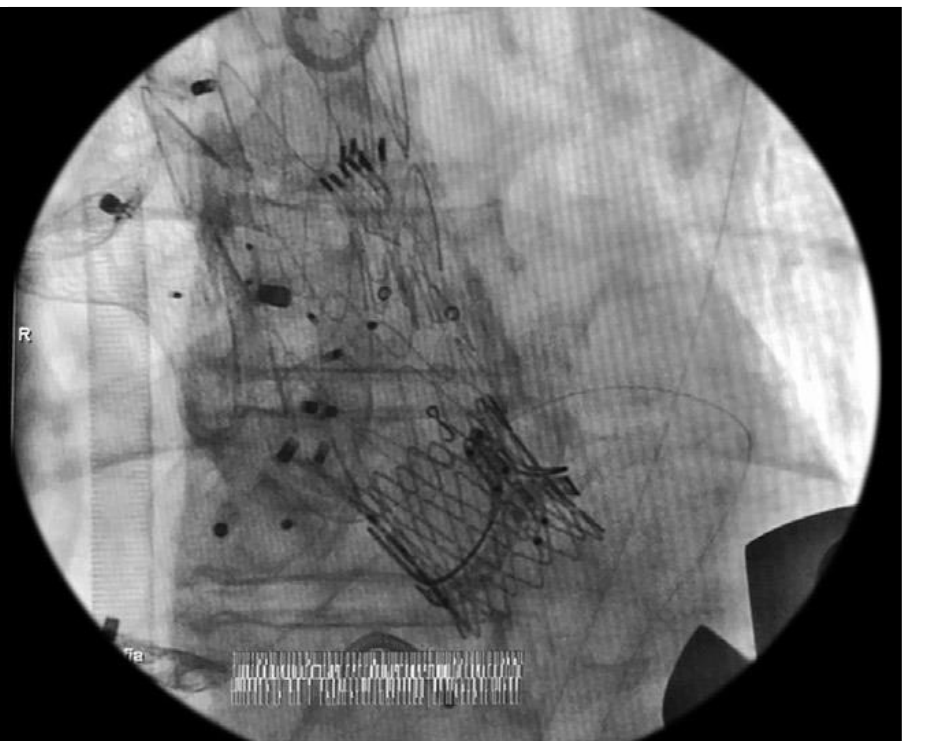
Diego Felipe Gaia, MD, PhD,^a Oscar Bernal, MD,^b Edilberto Castilho, MD,^a Carolina Baeta Neves Duarte Ferreira, MD,^a Danny Dvir, MD,^c Matheus Simonato, MD,^a José Honório Palma, MD, PhD^a

Endo-Bental concept #1



Endo-Bentall concept #1


- Balloon expandable THV (TAVI)
- Custom-made TEVAR stentgraft with branches (for coronary arteries)
- Both devices combined into one CMD
- TA access using 30F sheath



Endo-Bentall concept #2

Technical Note

Modular Endo-Bentall Procedure Using a “Rendez-Vous Access”

**Thomas Gandet, MD, PhD¹ , Dirk Westermann, MD, PhD²,
Lenard Conradi, MD, PhD³, Giuseppe Panuccio, MD, PhD¹,
Franziska Heidemann, MD¹, Fiona Rohlfes, MD, PhD¹,
and Tilo Kölbel, MD, PhD¹**

JOURNAL OF A SAGE Publication
ENDOVASCULAR
An official publication of the
ISEVS International Society of Endovascular Specialists
THERAPY.

Journal of Endovascular Therapy
2022, Vol. 29(5) 711–716
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DOI: 10.1177/15266028211065959
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Endo-Bentall concept #2

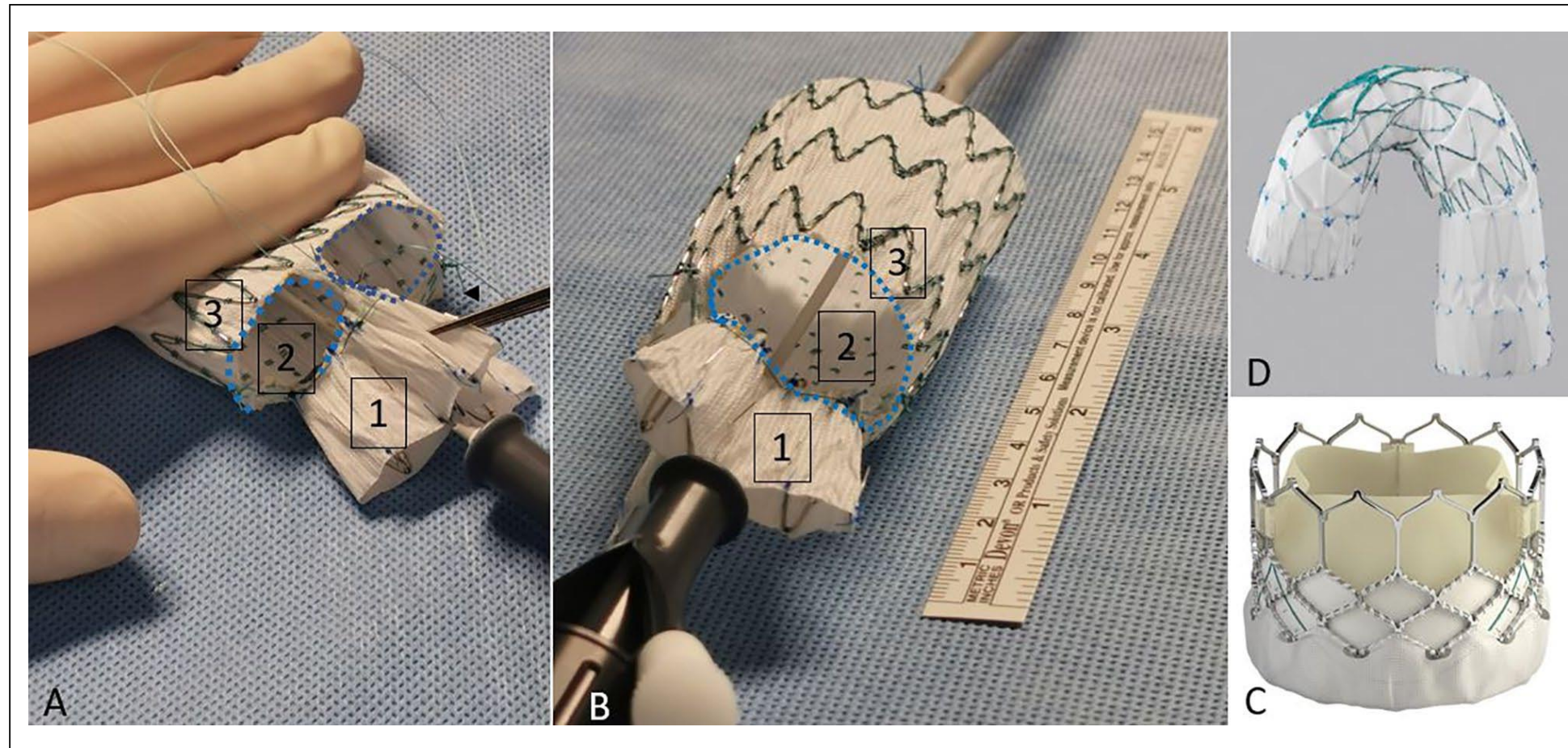
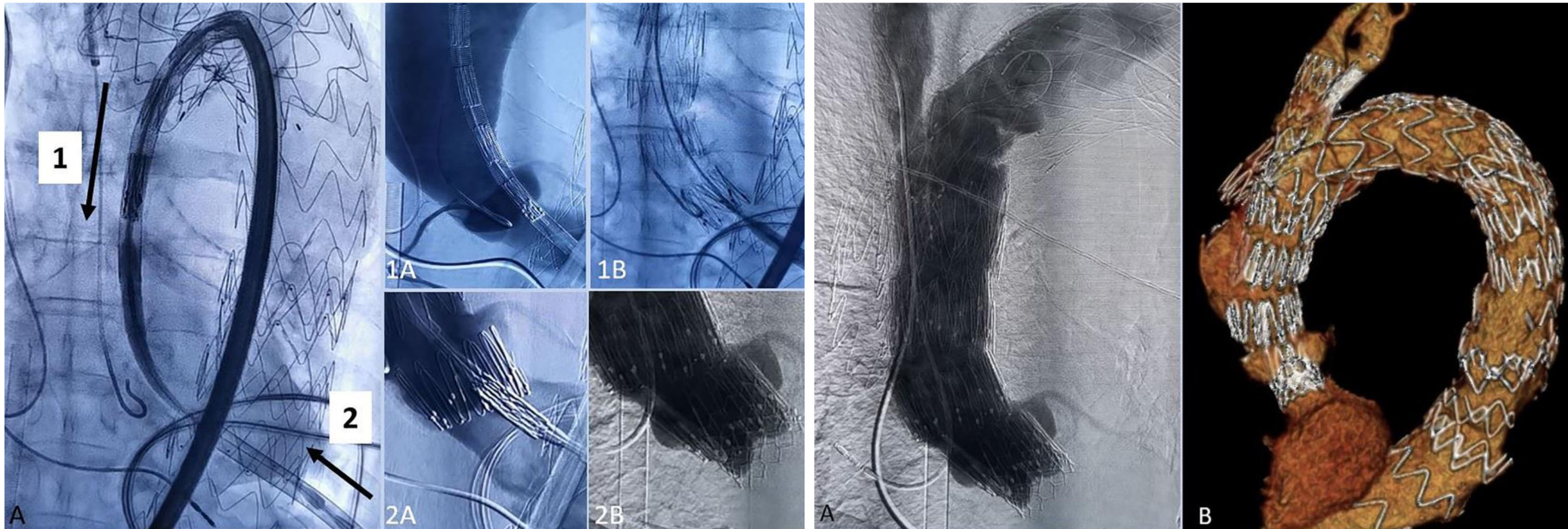


Figure 2. The devices. (A, B) The physician-modified endograft: (1) the proximal sealing stent aiming to land in the native aortic annulus; (2) the fenestrations for coronary artery perfusion; (3) the intermediate sealing stent aiming to land at the level of the sinotubular junction. (C) The balloon-expandable transcatheter aortic valve. (D) The inner branch arch endograft.

Endo-Bentall concept #2

- Balloon expandable THV (TAVI)
- Physician-modified endograft with fenestrations (coronary perfusion)
- The **devices are not combined into one** CMD
- TA/TF through-and-through wire
- Rapid **sequential deployment** (TF-TEVAR followed by TA-TAVI)

Endo-Bentall concept #2



Endo-Bentall concept #3

First-in-Human Endovascular Aortic Root Repair (Endo-Bentall) for Acute Type A Dissection

Mehrdad Ghoreishi , Diljon Chahal, Aakash Shah, Jeanwan Kang, Jeffrey Hirsch, Douglas Tran, Dana McCloskey, Melsjan Shkullaku, Anuj Gupta, Erik R. Strauss, Siamak Dahi, Bradley S. Taylor and Shahab Toursavadkahi 

Originally published 22 Sep 2023 | <https://doi.org/10.1161/CIRCINTERVENTIONS.123.013348> | Circulation: Cardiovascular Interventions. 2023;16

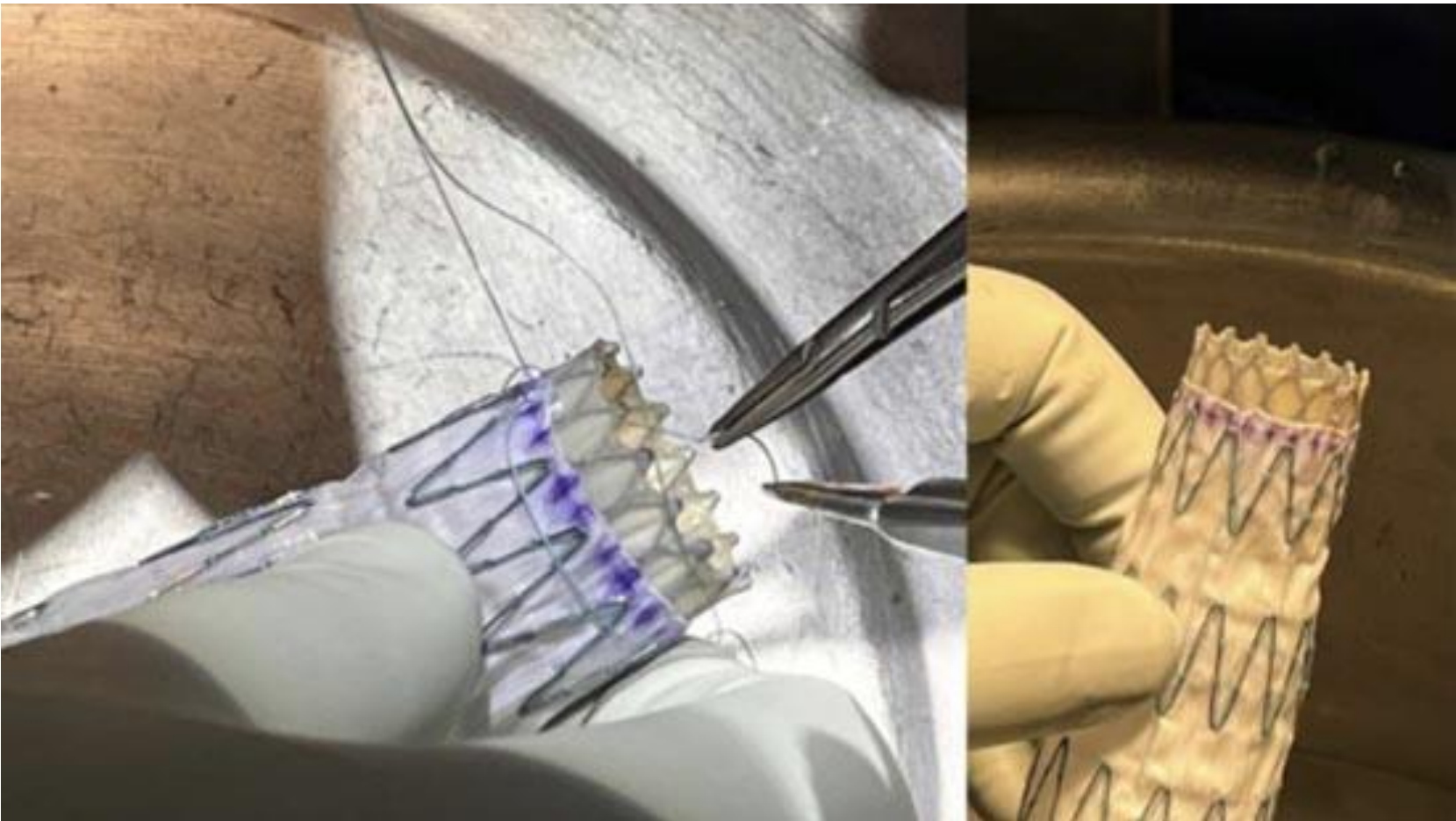
Circulation: Cardiovascular Interventions

CASE REPORTS IN INTERVENTIONAL CARDIOLOGY

First-in-Human Endovascular Aortic Root Repair (Endo-Bentall) for Acute Type A Dissection

Mehrdad Ghoreishi , MD; Diljon Chahal , MD; Aakash Shah , MD; Jeanwan Kang, MD; Jeffrey Hirsch, MD; Douglas Tran , MD; Dana McCloskey, MD; Melsjan Shkullaku, MD; Anuj Gupta, MD; Erik R. Strauss , MD; Siamak Dahi , MD; Bradley S. Taylor , MD; Shahab Toursavadkahi, MD

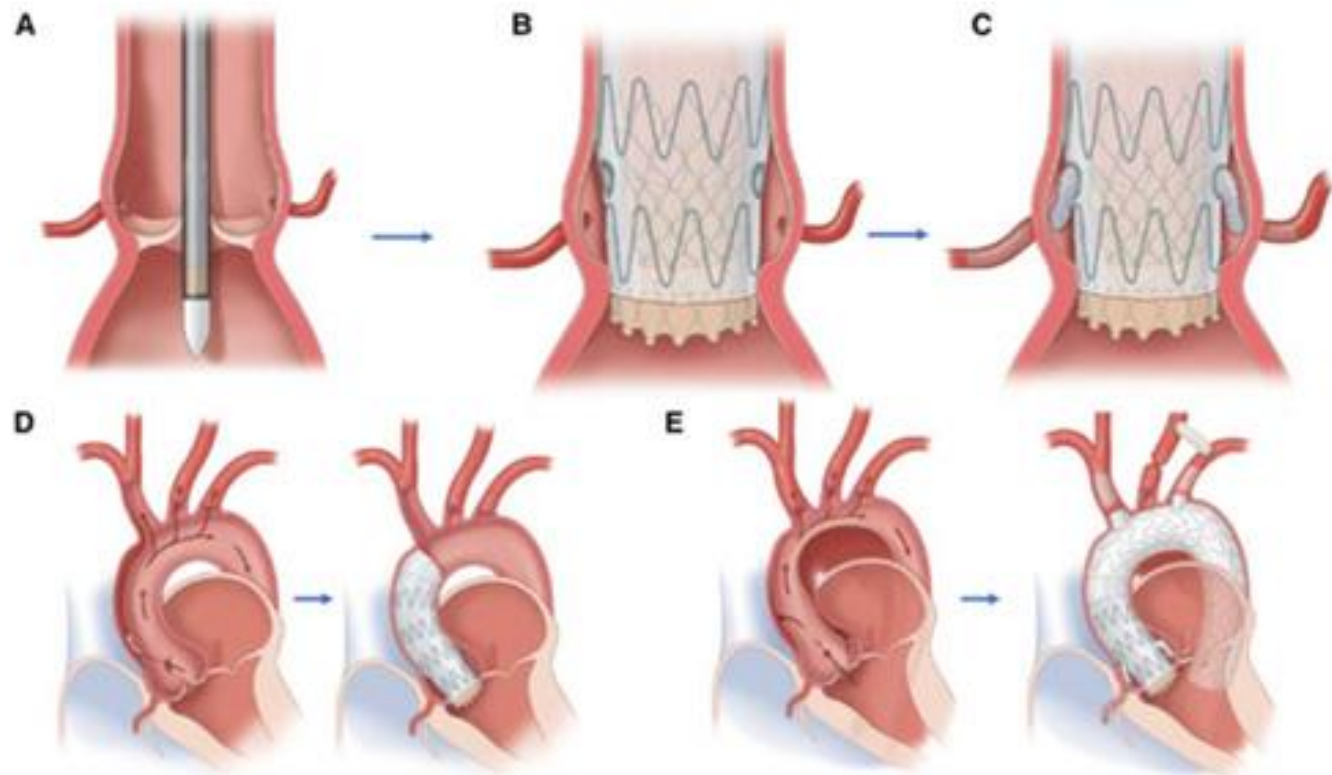
Endo-Bentall concept #3



Endo-Bentall concept #3

- Self-expanding THV (TAVI)
- TEVAR stentgraft with fenestrations (for coronary arteries)
- Both devices combined into one physician-constructed device
- TF access using TEVAR delivery system


Endo-Bental concept #3



Endo-Bentall concept #4

Review

Endo-Bentall for proximal aortic dissection: from conception to application

**Maximilian Kreibich^{1,2} , Bartosz Rylski^{1,2},
Friedhelm Beyersdorf^{1,2}, Matthias Siepe^{1,2} and
Martin Czerny^{1,2}**

ASIAN
CARDIOVASCULAR & THORACIC
ANNALS

Asian Cardiovascular & Thoracic Annals
2021, Vol. 29(7) 697–700

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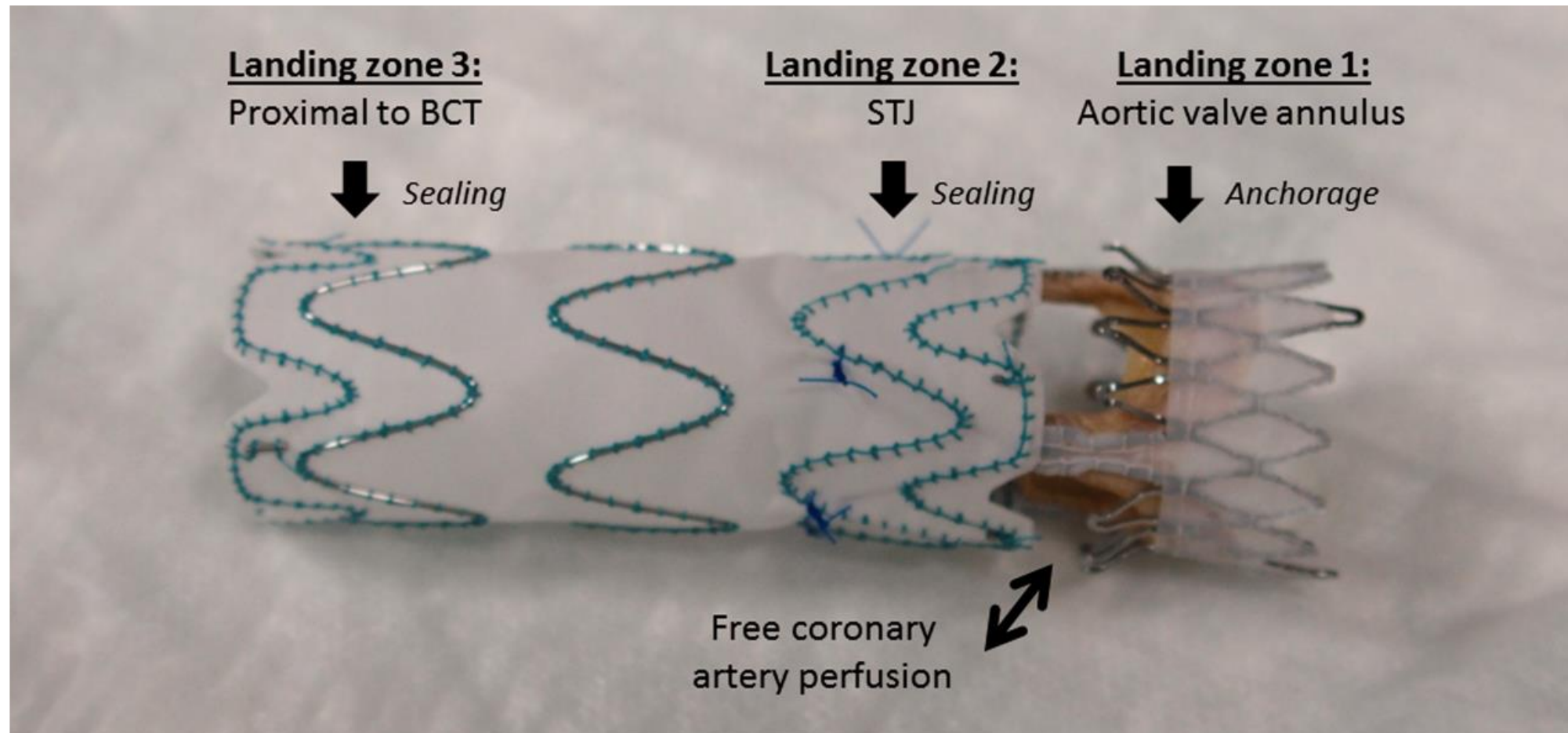
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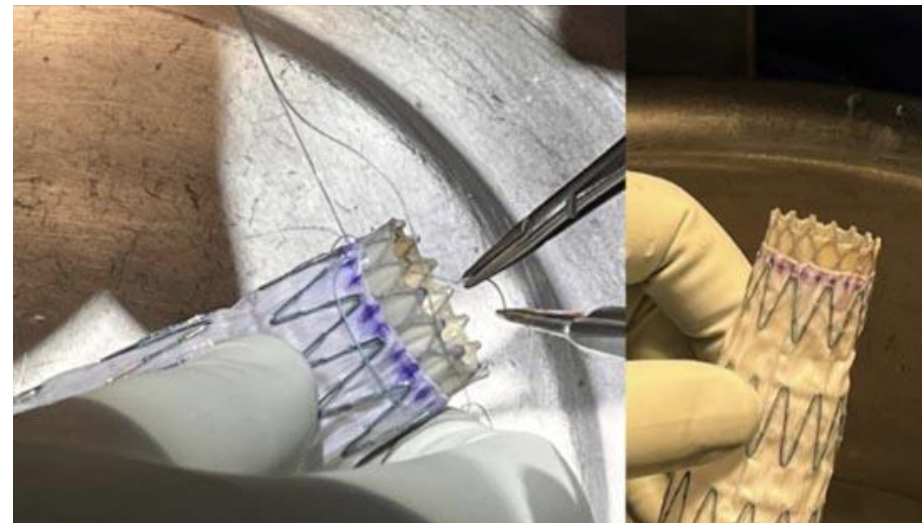
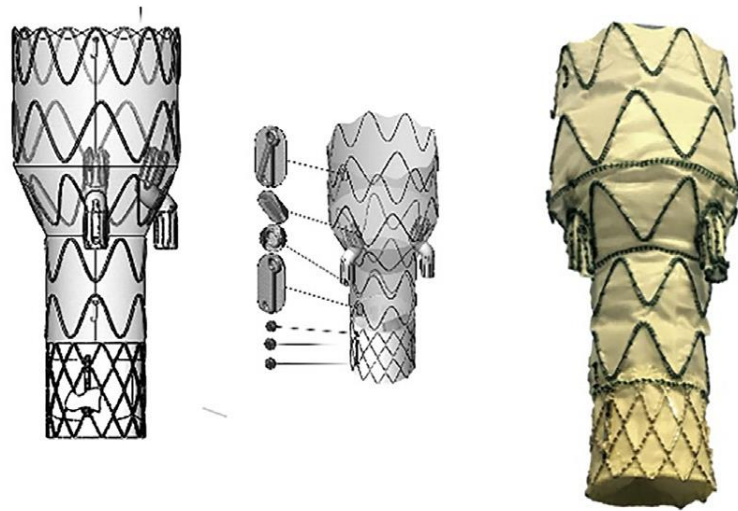
Endo-Bentall concept #4



Endo-Bentall concept #4

- Self-expanding THV (TAVI)
- TEVAR stentgraft (no branches/fenestrations)
- Both devices combined into one physician-constructed device
- Gap between sealing skirt of the THV and membrane of stentgraft
- TA access using a large sheath

What THVs could be considered for Endo-Bentall?

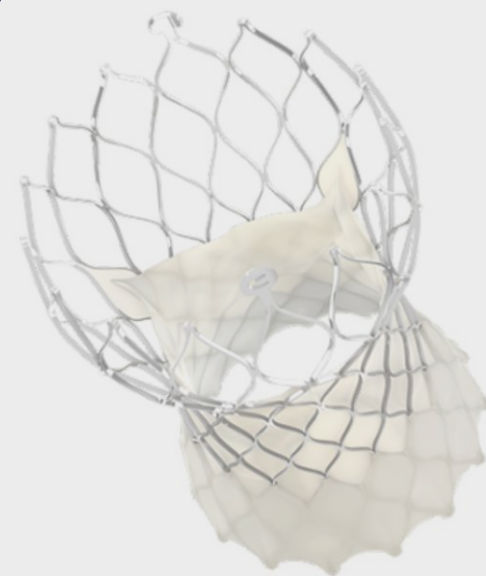


There are several THV types



SAPIEN 3 Ultra™

Balloon-expandable

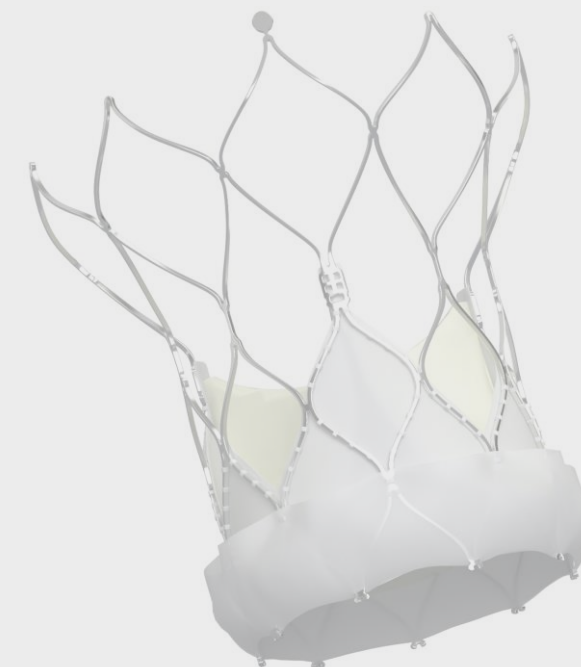


Evolut Pro+™



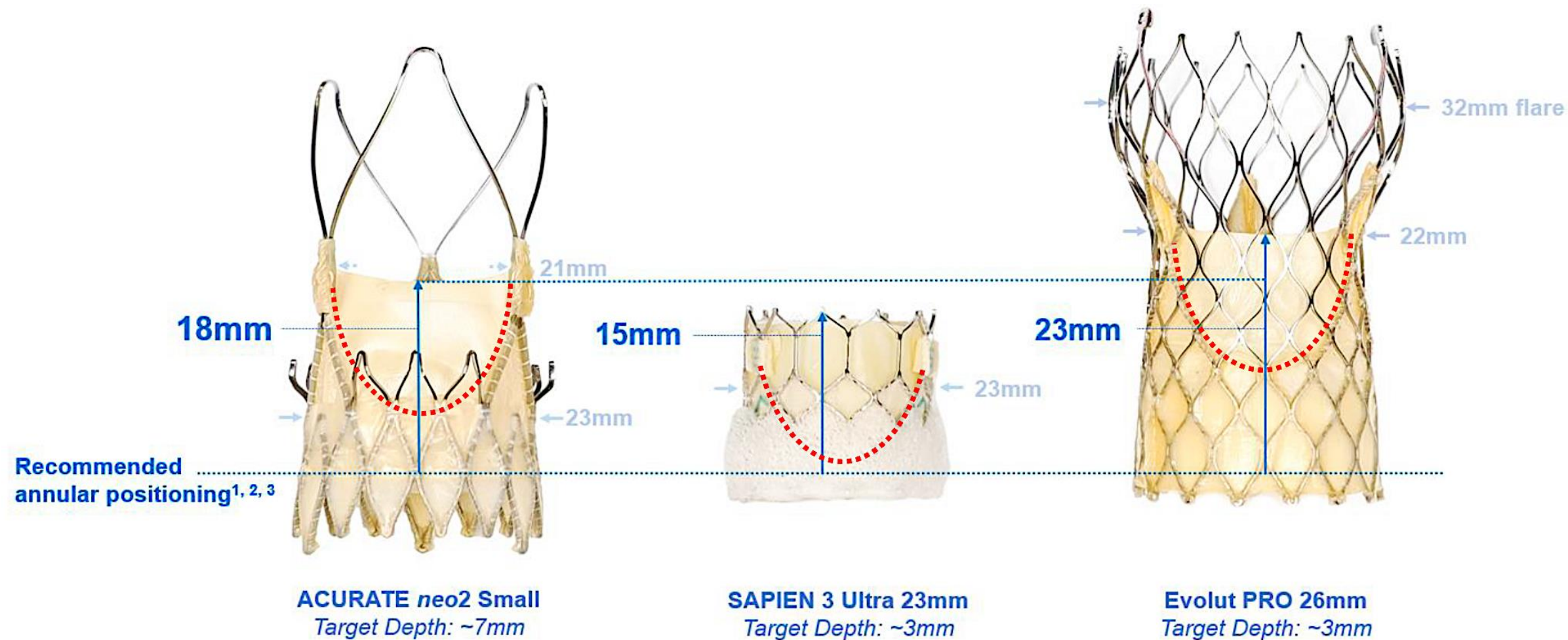
ACURATE neo2™

Self-expanding

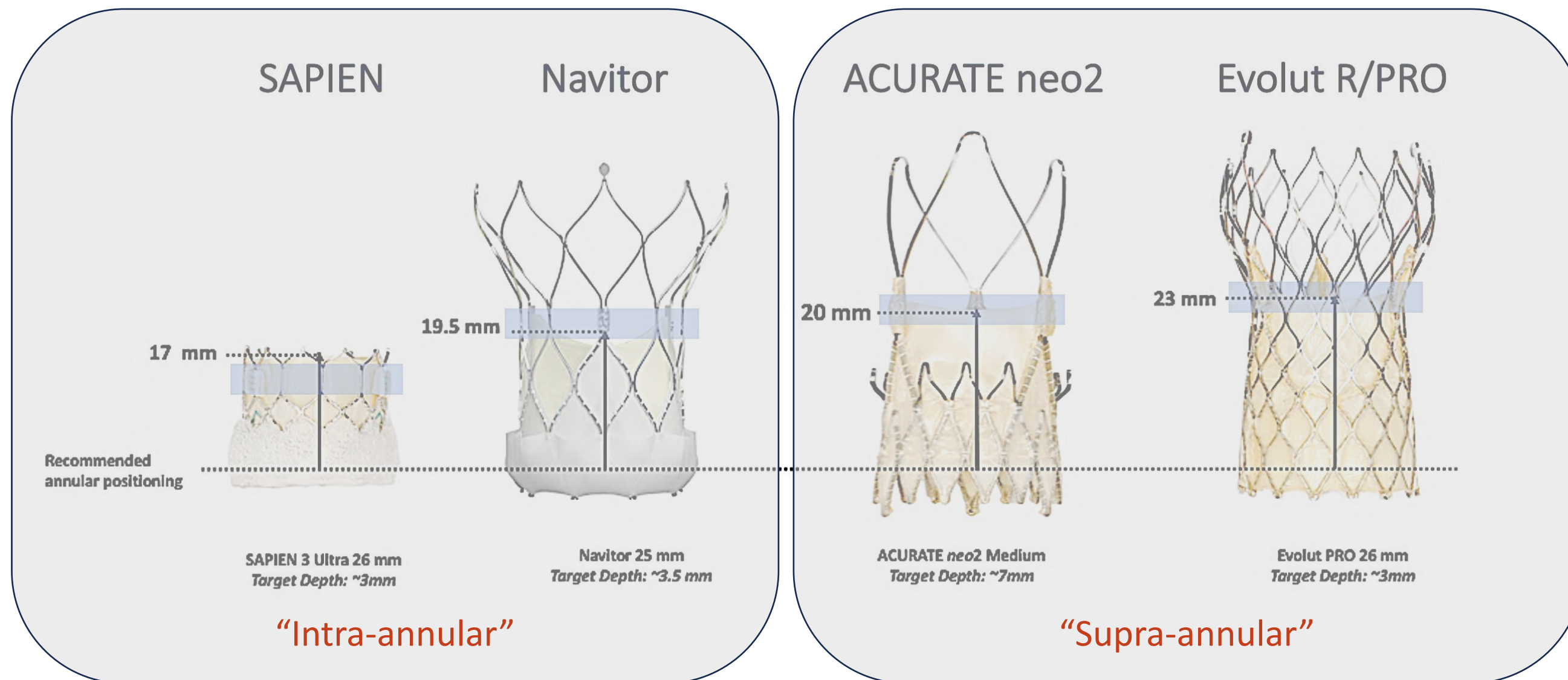


Navitor™

Different frame height and size of stent cells



Different height of THV leaflets / commissures



Intra-annular vs. supra-annular leaflet position

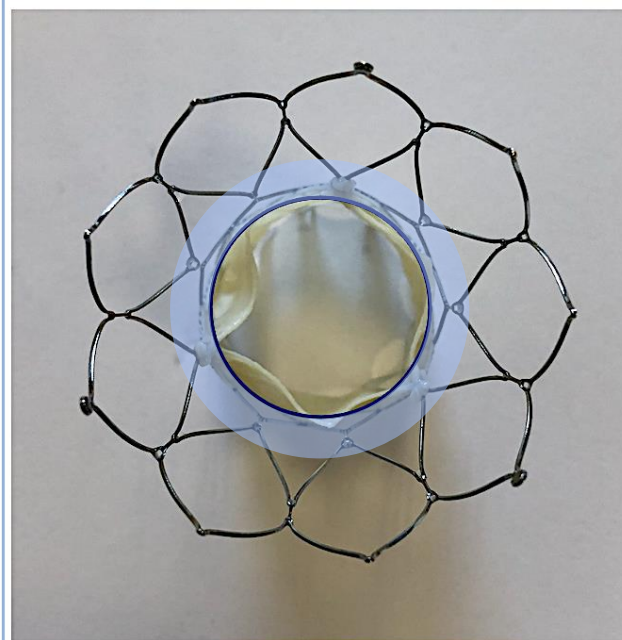
Different stent frame geometry in asc. aorta

SAPIEN

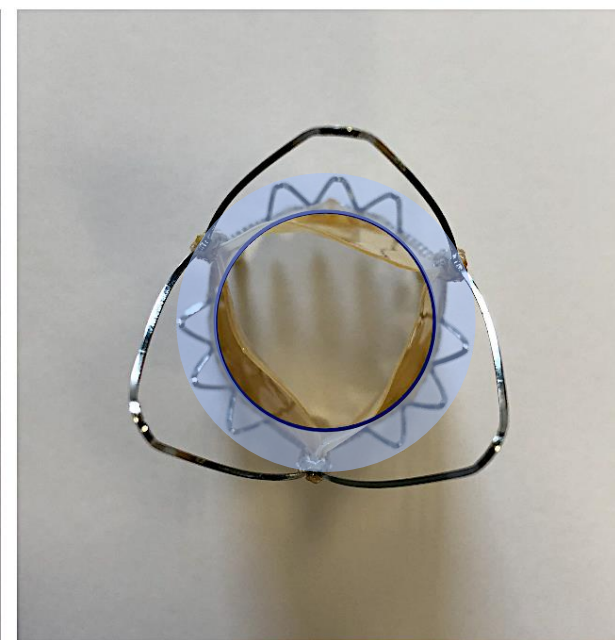


Commissural posts/sutures
Interior to opening area

Navitor

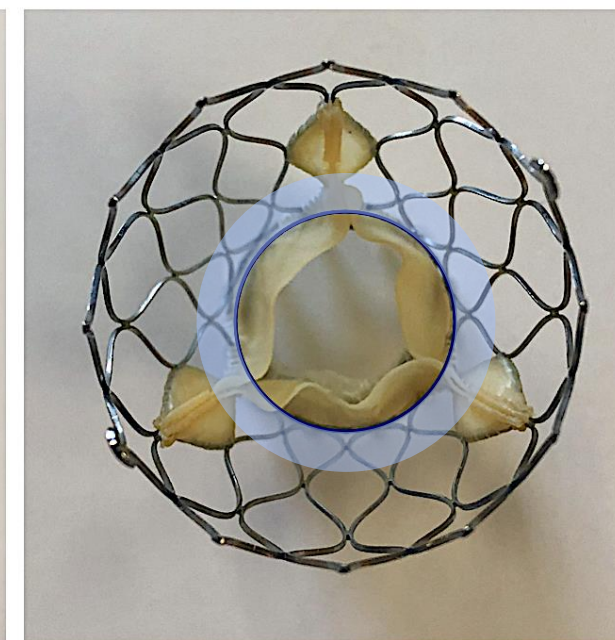


ACURATE neo2

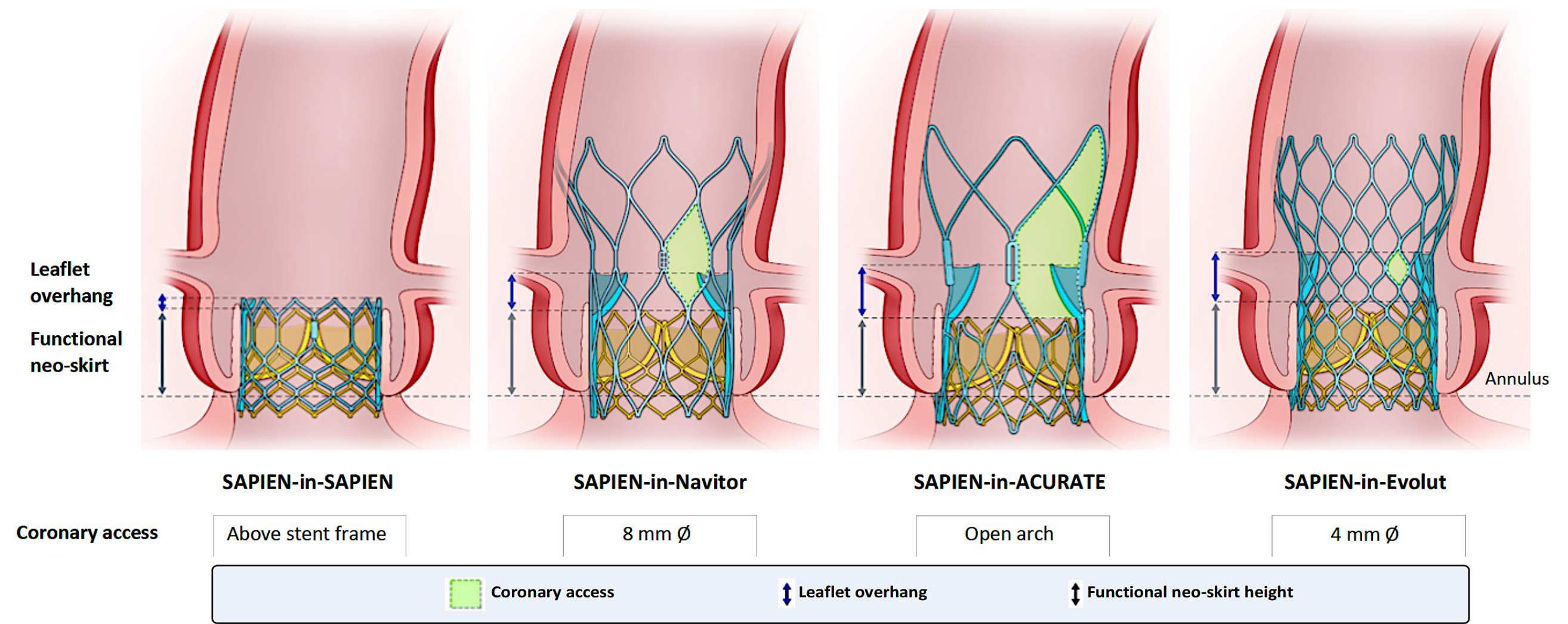


Commissural posts/sutures
Exterior to opening area

Evolut R/PRO



Different size of stent cells for coronary access



Summary

- Endo-Bentall is an option for patients with too high risk for open surgery
- Collaboration within MDT (“aorta team”) is of utmost importance
- Long-term durability and reproducibility is unknown
- Different design concepts for Endo-Bentall exist
- Further testing and follow-up are needed

Thanks for your attention