Pi-Cardia
Next-Generation Valve Repair

Pi-Cardia ShortCut™

Division of Bioprosthetic Aortic Valve Leaflets

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March 19, 2024

Agenda

i. Lifetime Management of Aortic Stenosis

ii. Need for Leaflet Modification will Grow Significantly

iii. Risk of coronary obstruction post TAVR

iv. Coronary Obstruction Leads to Poor Patient Outcomes

v. Risk Factors for TAVR-Induced Coronary Obstruction

vi. ShortCut™ - First Dedicated Leaflet Splitting Device

vii. ShortCut™ Clinical Experience

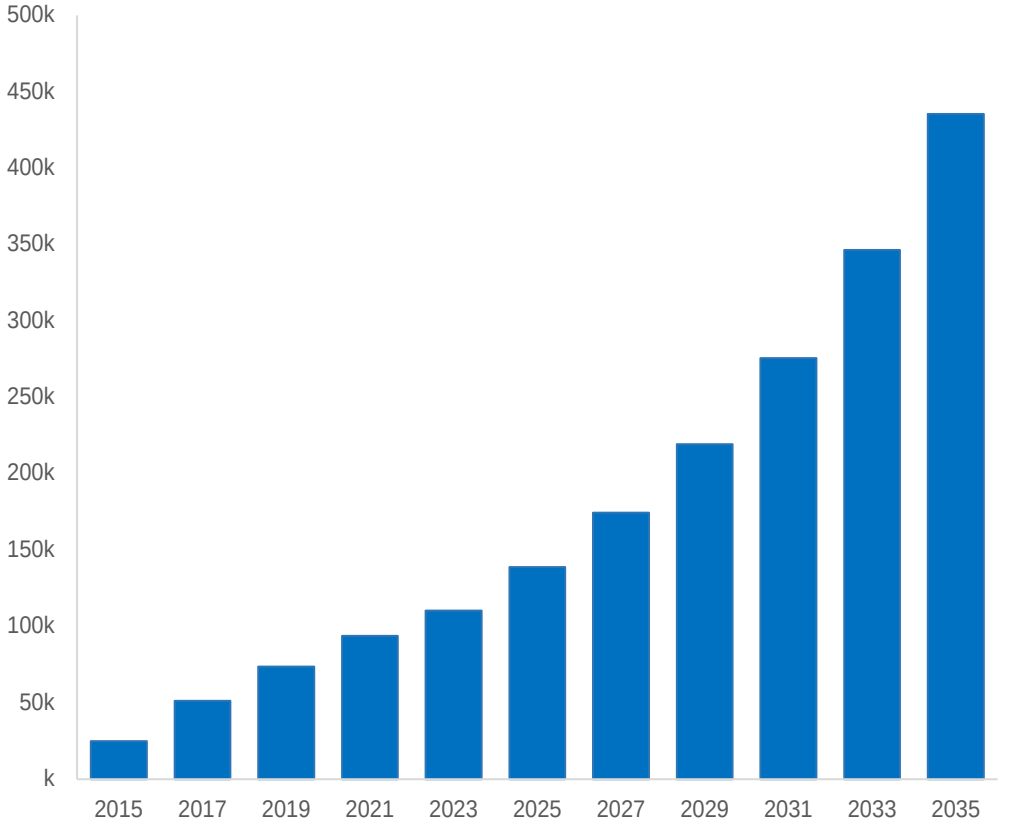
Lifetime Management of Aortic Stenosis

- **TAVR growth** has been primarily driven by indication expansion into **the low-risk** patient population, many of whom are **younger** and will **require multiple interventions** over their **lifetime**.
- **Leaflet splitting** techniques may become imperative to facilitate **safe treatment** in patients **requiring multiple valve therapies**.

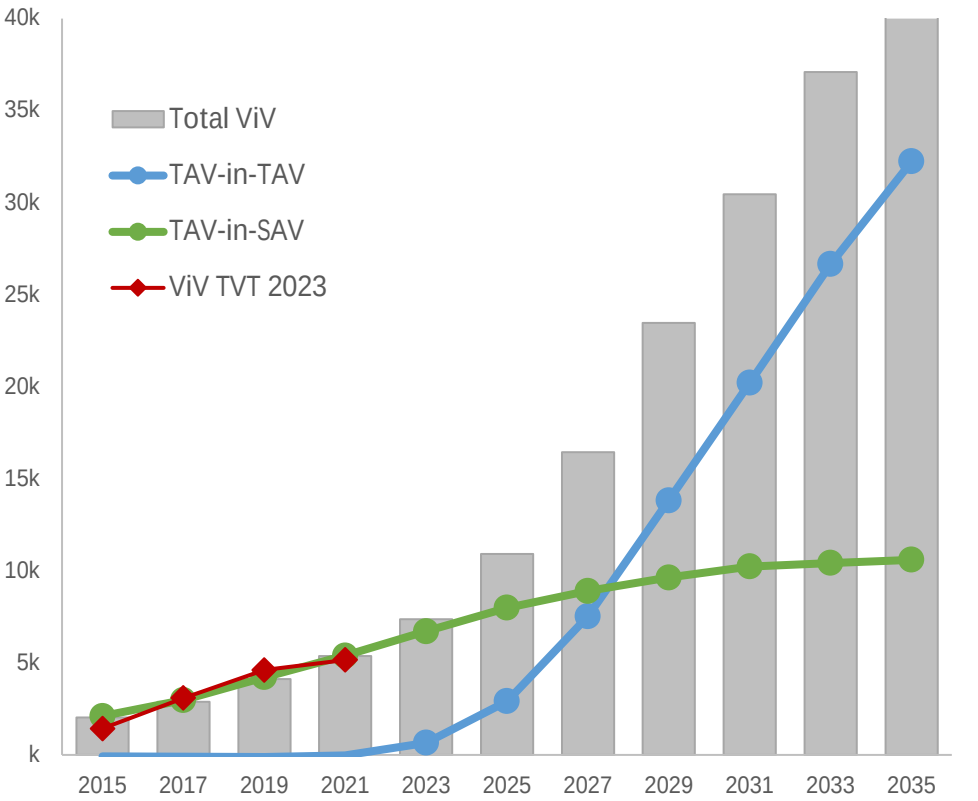
Need for Leaflet Modification will Grow Significantly

as TAV-in-TAV "Wave" Hits in <5 Years

Annual US TAVR Procedures[1]



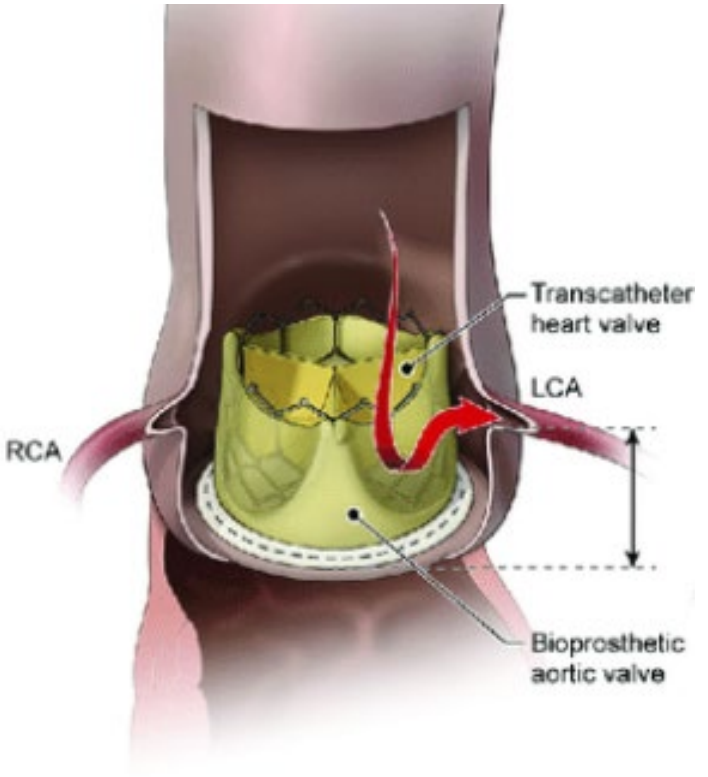
US ViV Procedure Forecast[2]



1. TVT Registry US Data 2023 (2012-2022)
2. Courtesy: P Genereux, R Puri, MB Leon, D Dvir, M Szerlip, R Dar - Publication in Progress

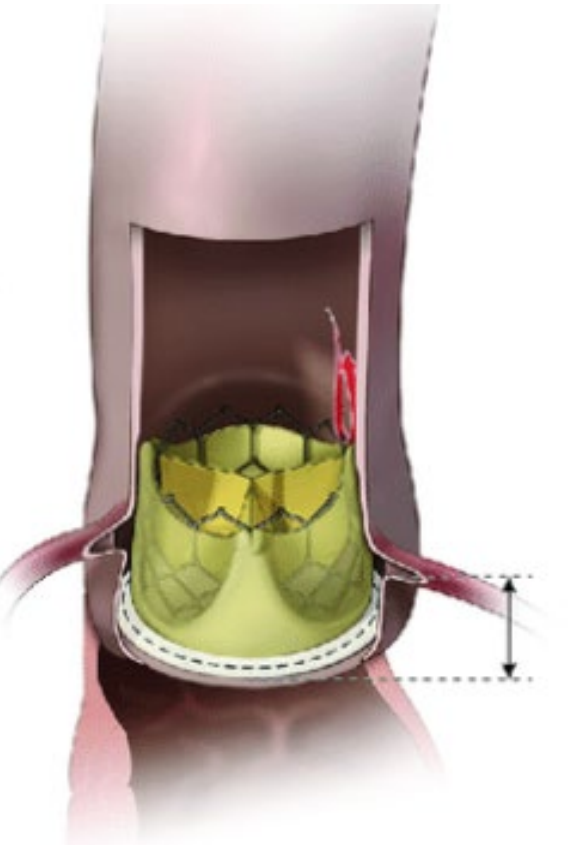
Risk of Coronary Obstruction Post TAVR

Capacious Sinus



TAVR in a capacious aortic route, blood flows unrestricted around the valve leaflet into coronary artery

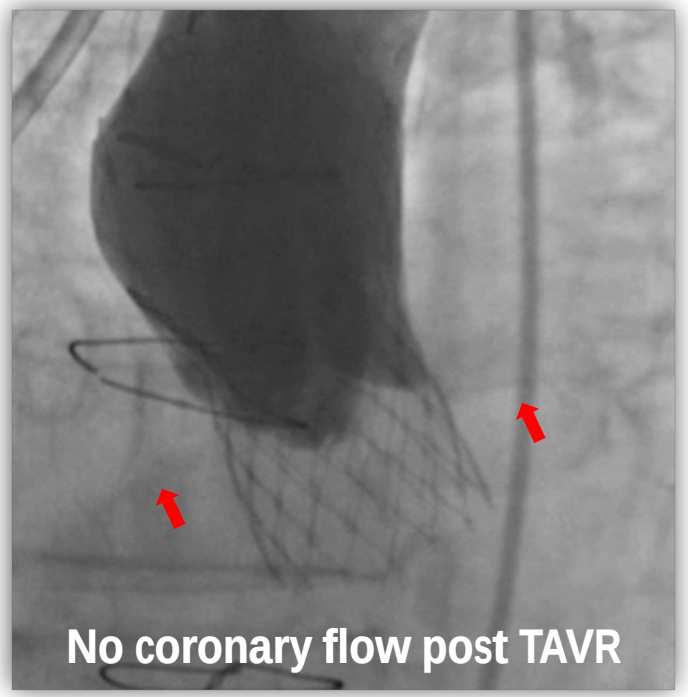
Narrow Sinus



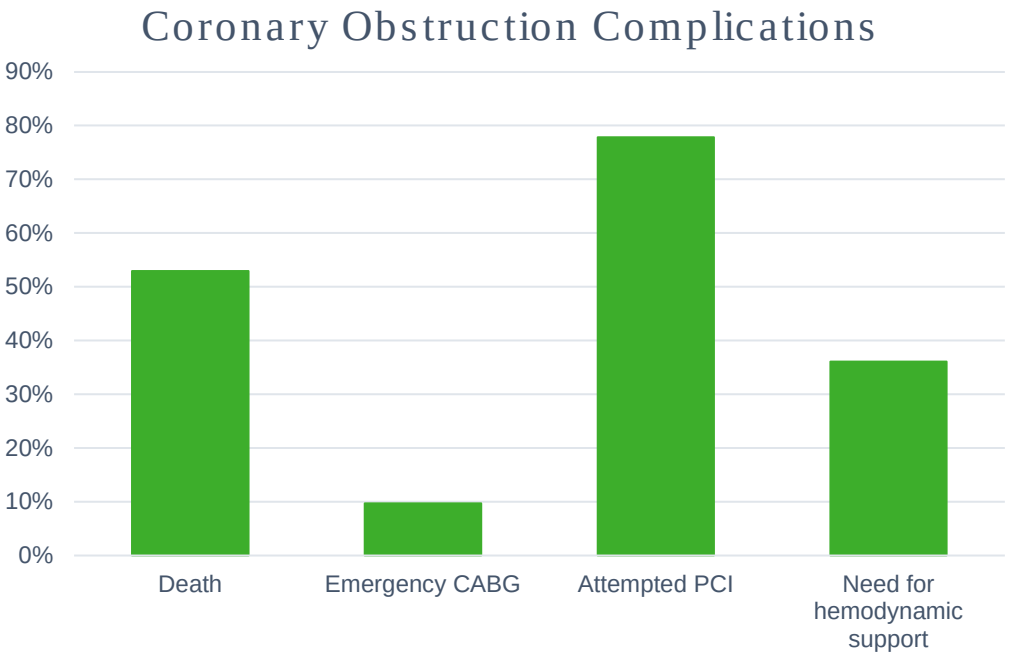
In narrow sinus and low-lying coronary arteries, coronary flow is obstructed by the bioprosthetic valve after TAVR

Khan, Jaffar M., et al. "Transcatheter laceration of aortic leaflets to prevent coronary obstruction during transcatheter aortic valve replacement: concept to first-in-human." JACC: Cardiovascular Interventions 11.7 (2018): 677-689.

Coronary Obstruction Leads to Poor Patient Outcomes



Incidence of Coronary obstruction (CO) in TAVR-in-SAVR irrespective of risk factors is 2.3-3.5%[1,2,3]



CO stands out as one of the most worrisome complications during TAVR, with 40-50% mortality[1]

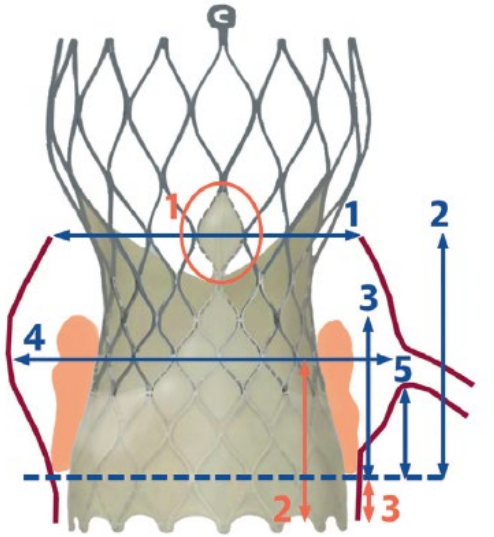
1. Ribeiro et al .jacc.2013.07.040
2. Dvir et al Circulation. (2012) 126:2335–44. 10.1161
3. Ribeiro H, Dvir D, et al . VIVID Registry. Eur Heart J. 2018. 39(8):687-695

Risk Factors for TAVR-Induced Coronary Obstruction

Mechanism of coronary obstruction during TAVR[1]

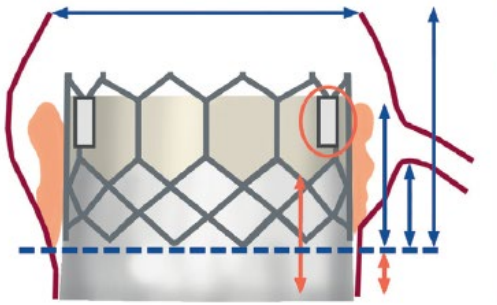
- Direct obstruction by coronaries by leaflet
- Indirect obstruction by sinus sequestration where leaflet blocks the entire sinus of Valsalva
- Obstruction by calcified nodule on the leaflet
- Obstruction by TAVR commissural post or skit
- Obstruction by embolized (thrombus or degenerative) material

Factors Impacting Coronary Access[2]



Anatomical

1. Sinotubular junction dimensions
2. Sinus height
3. Leaflet length and bulkiness
4. Sinus of Valsalva width
5. Coronary height

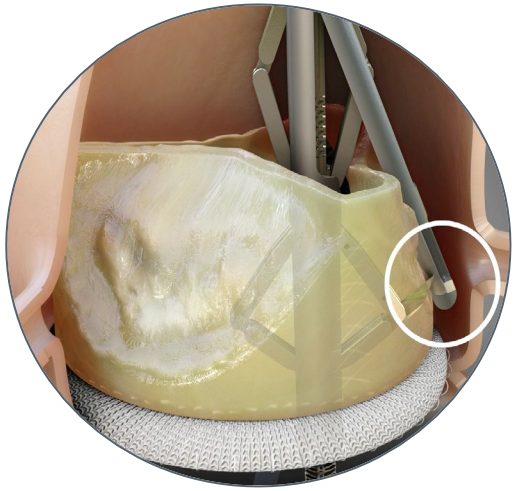


Device and Procedural

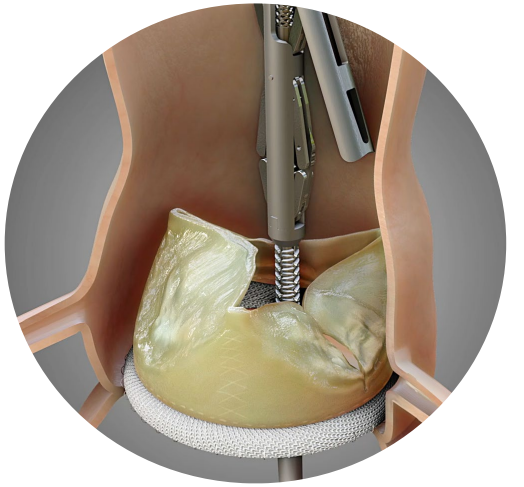
1. Commissural tab orientation
2. Sealing skirt height
3. Valve implant depth

1. Yerasi, et al. CARDIAC INTERVENTIONS TODAY. VOL. 15, NO. 2 MARCH/APRIL 2021
2. Yudi, M.B. et al. J Am Coll Cardiol. 2018;71(12):1360–78.

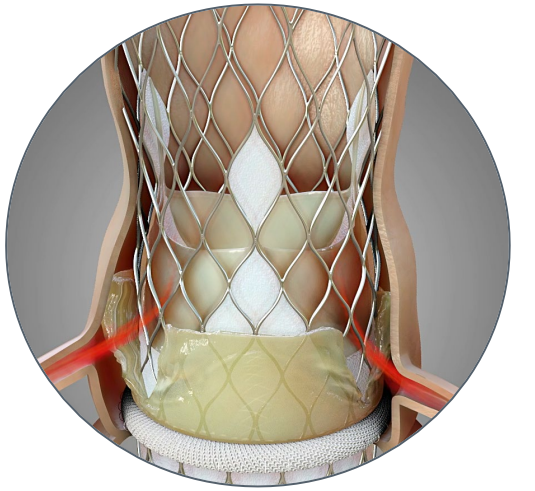
ShortCut™ - First Dedicated Leaflet Splitting Device



Designed to split the bioprosthetic valve leaflet to prevent coronary obstruction post- TAVI



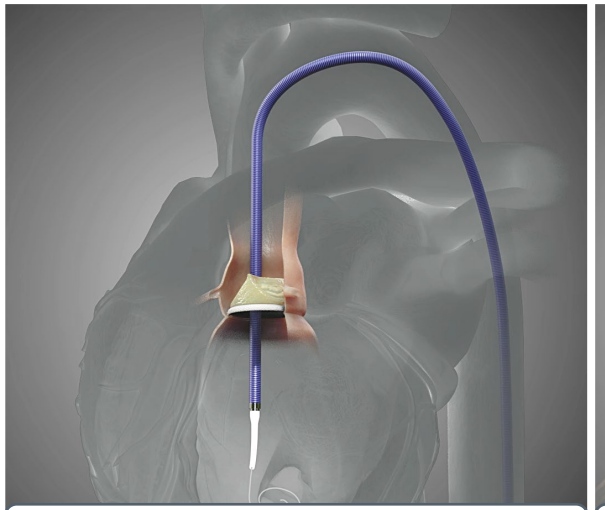
Control over positioning and leaflet splitting location for single or dual leaflet split



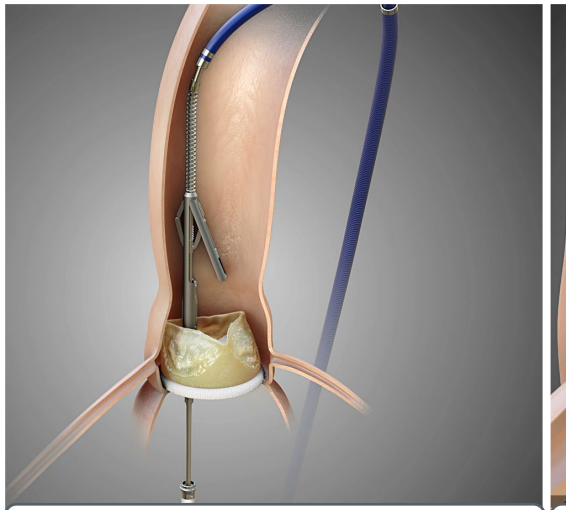
Early experience has demonstrated safe and successful splitting of degenerated bioprosthetic leaflets

Dvir D et al. JACC: Vol. 16. No. 1, 2023

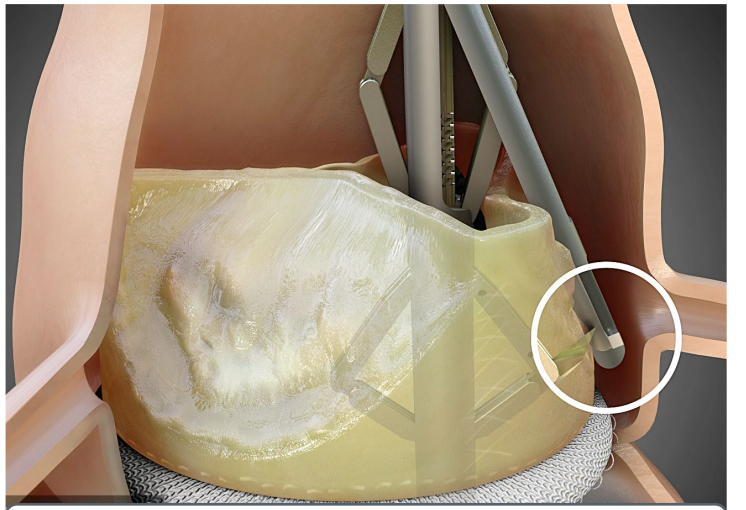
ShortCut™ - First Dedicated Leaflet Splitting Device



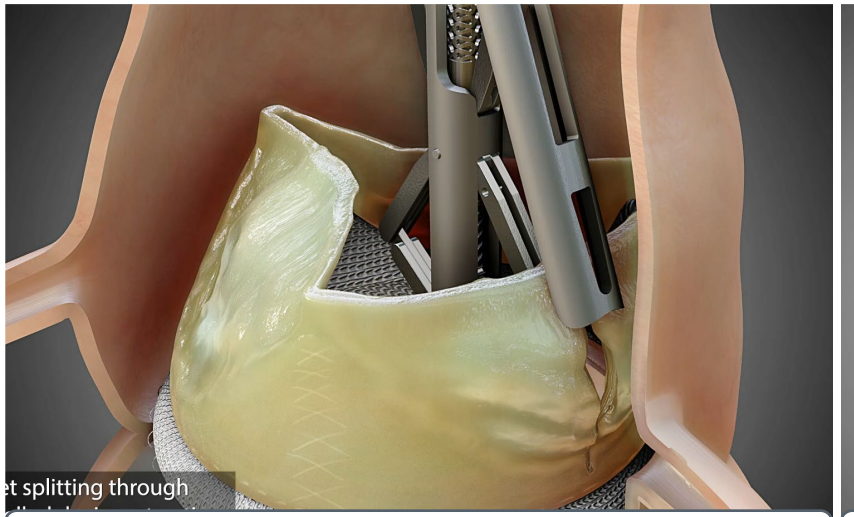
Positioning



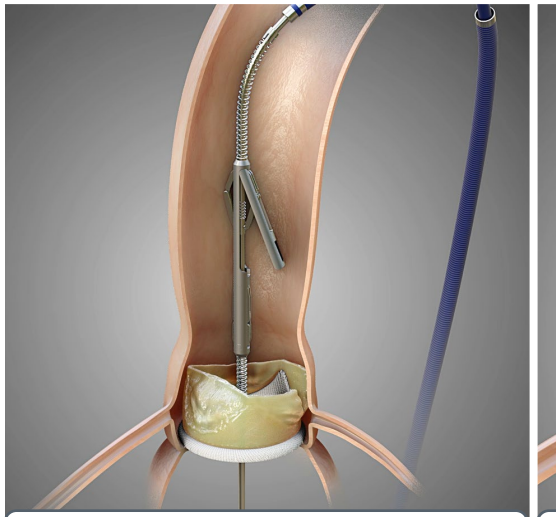
Unsheathing



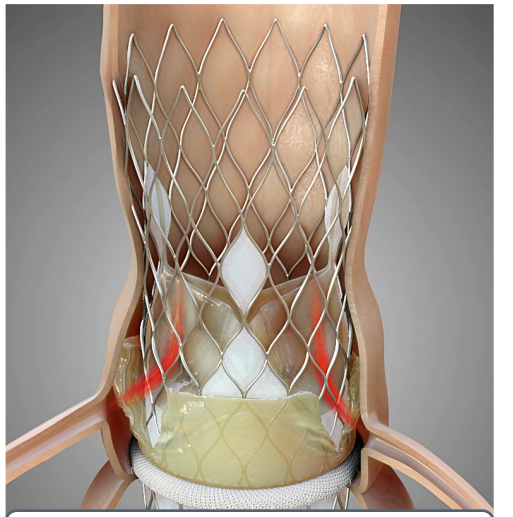
Splitting Element Activation



Leaflet Splitting



Catheter Withdrawal



Post-TAVR

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Multiple Degenerated Valves Treated with ShortCutï

Stented

Perimount
(Edwards)

Hancock II/Mosaic
(Medtronic)

Magna Ease
(Edwards)

Stentless

Freestyle
(Medtronic)

Freedom Solo
(Sorin)

3F
(Medtronic)

Prima root
(Edwards)

Stented, Externally Mounted Leaflets

MitroFlow
(Sorin)

Trifecta
(St Jude Medical)

Crown
(Sorin)

Sutureless

Perceval
(Sorin)

TAVR Valves

SAPIEN XT
(Edwards)

SAPIEN 3
(Edwards)

Evolut
(Medtronic)

ClinicalTrials.gov NCT04952909

ShortCut™ Pivotal Study Objective & Endpoints

Received CMS IDE Category B Coverage Approval

Study Objective: Assess safety & effectiveness of the ShortCut device for splitting bioprosthetic aortic valve leaflets in patients at risk for ViV-induced coronary obstruction (CO)

Primary

Safety: ShortCut procedure-related mortality, stroke assessed within 7D

Effectiveness : Leaflet splitting success assessed intra-procedurally

Secondary

Safety: Assessed through 30D

- All-cause mortality, stroke
- CO, MI w/ new evidence of CO requiring intervention
- Major vascular complications
- Cardiac tamponade, acute kidney failure & access related type III-IV bleeding

Effectiveness: Assessed through 30D post procedure

- Freedom from CO / intervention related to the intervened leaflet

Technical Success: Assessed at exit of procedure room

Rigorous Study Structure

Screening Committee → Core Lab Adjudicated → Clinical Events Committee → Data Safety Monitoring Board

ClinicalTrials.gov NCT04952909

ShortCut™ Clinical Experience

Study completed, publication in progress

ShortCut Pivotal Study (N=60)

Patient Characteristics	N (%) or Mean
Age (years)	77.0 ± 9.6
Gender female	42 (70%)
STS score (%)	4.4 ± 2.5
Surgical risk	
High	54 (90%)
Extremely high	6 (10%)
NYHA Class	
I-II	20 (33%)
III-IV	40 (67%)
Aortic Valve Disease	
Isolated aortic stenosis (AS)	35 (58%)
Isolated aortic regurgitation (AR)	7 (12%)
Mixed failure (AS+AR)	18 (30%)
LVEF (%)	54 ± 10
AV peak velocity (m/s)	398 ± 67
AV mean gradient (mm/Hg)	38 ± 15
AVA (cm^2)	1± 0.5
Bioprosthetic Valve Type	
TAVR	2 (3%)
SAVR – stented, internally mounted	29 (48%)
SAVR – stented, externally mounted	25 (42%)
SAVR – stentless	4 (7%)
CT Measurements and Risk Factors	
Annulus diameter (mm)	20.1± 2.1
Coronary height (mm)	6.9 ± 2.7
VTC (mm)	3.3 ± 1.2
VTS (mm)	2.2 ± 1.4

ClinicalTrials.gov NCT04952909

ShortCut Early Clinical Experience (N=8)

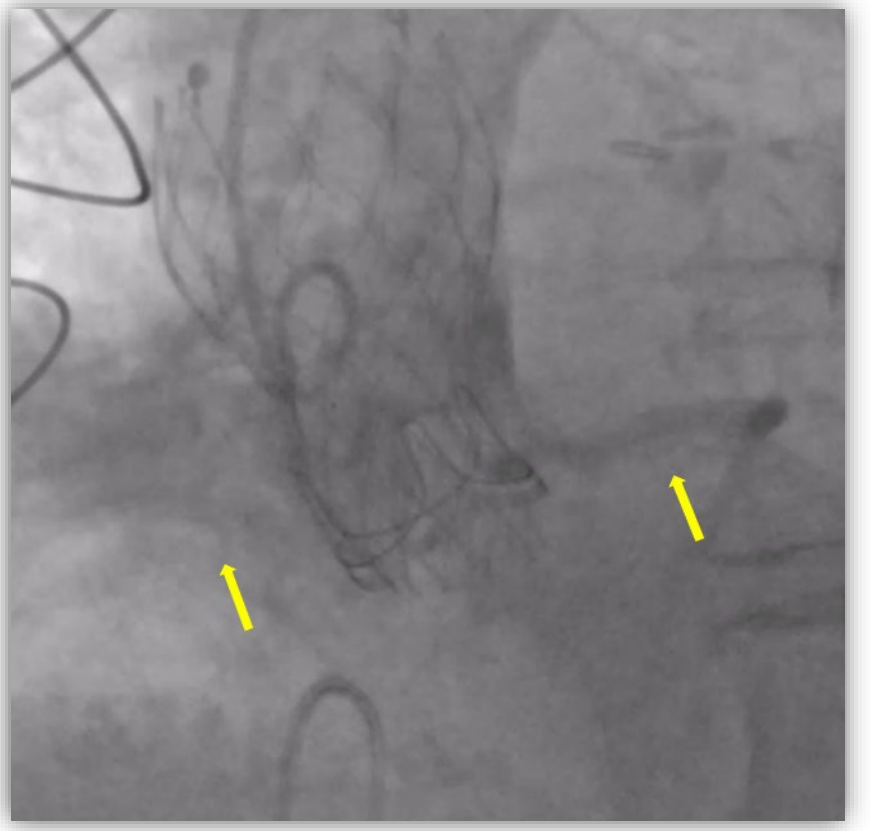
Procedural Details and Clinical Outcomes	N (%) or Mean
Procedural details	
Treated leaflet	
Left	5 (62.5)
Left and right	3 (37.5)
General anesthesia	8 (100)
TEE	8 (100)
Overall procedure time, min	137 (108-155)
ShortCut procedure time, min	19 (16-23)
ViV TAVR procedure time, min	6 (4-16)
Implanted valve	
Balloon expandable	3 (62.5)
Self-expandable)	5 (37.5)
Bioprosthetic valve size, mm	23 (22-26)
Post-TAVR assessments	
Coronary obstruction	0 (0)
Moderate or greater AR	0 (0)
Mean gradient, mm Hg	10 (7-10)
LVEF, %	58 (51-60)
Transient hemodynamic deterioration	1 (12.5)
Stroke/TIA	0 (0)
Major vascular complication	1 (12.5)
Life-threatening bleeding	0 (0)
Need for a permanent pacemaker	0 (0)
30-d mortality	0 (0)

Dvir D et al. JACC: Vol. 16. No. 1, 2023

ShortCut™ Case Experience to Date

>70 clinical procedures performed to date demonstrating safety & performance:

- Multiple sites/operators across the globe
- Efficient and predictable procedure
- Successful split clearly visualized
- Good blood flow and access to the coronaries post TAVR implantation



TAVR Implant Post Splitting with good coronary flow

ShortCut ™ Documentation

- Documentation of the ShortCut™ device would likely be found in the Operating Room report or progress notes.

- Alternate terms used to identify and describe the Pi-Cardia ShortCut™ device:
  - ShortCut™ Catheter
  - Leaflet Splitting device
  - ShortCut™ Procedure
  - Leaflet Modification device
  - Leaflet Laceration device
  - Leaflet Division device

ShortCut™ Integrates Well Into Patient Care

- Coronary compromise/obstruction is associated with a mortality rate up to 50%.
- There is an unmet clinical need for leaflet splitting in patients undergoing ViV-TAVR who are at risk for coronary obstruction.
- There is no real alternative:
  - Many of these patients are at elevated surgical risk for redo surgery.
  - Preventive techniques are off label and sub-optimal.
- The ShortCut™ device is the first dedicated leaflet splitting procedure that is controlled, predictable and reproducible.
- Current ICD-10-PCS codes do not uniquely identify the ShortCut™ procedure.
- Modification with more granular coding is needed for accurate reporting and outcome-tracking of splitting of bioprosthetic aortic valve leaflets.