Transcatheter Mitral Valve Replacement: Current Trends and Future Perspectives

Juan F. Granada, MD
Cardiovascular Research Foundation
New York

Disclosure Statement of Financial Interest

Within the past 12 months, I or my spouse/partner have had a financial interest/arrangement or affiliation with the organization(s) listed below.

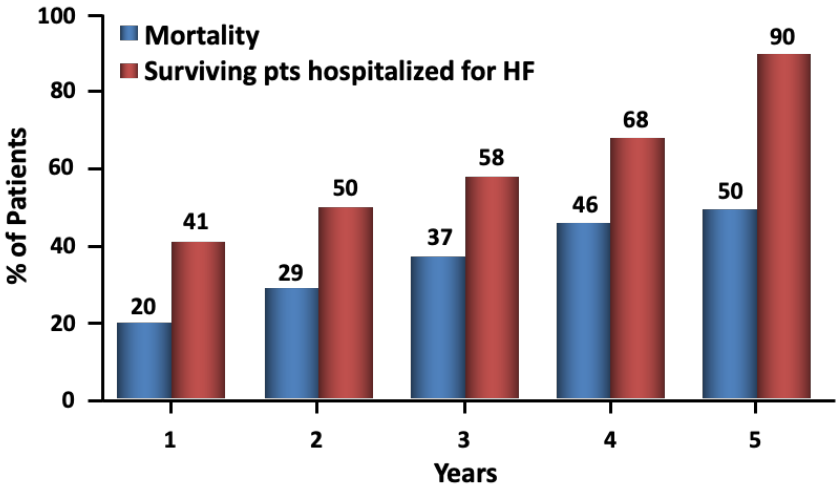
Affiliation/Financial Relationship	Company
Institutional Grant/Research Support	Abbott, BSCI, Medtronic, Edwards
Co-Founder	Cephea Valve Technologies (Abbott)

Natural History of Severe MR in the Real World

1,095 Pts* With 3+/4+ MR and HF (2000 to 2008)

- 74% FMR vs.21% DMR
- DMR Pts (N=226):
  - 84% SURGERY vs. 16% Med Rx
- FMR Pts (N=814):
  - 36% SURGERY vs. 64% Med Rx
- Un-Operated Med Rx Patients:
  - Lower LVEF
    Mean 27% Vs. 42%, P<0.0001
  - Higher STS Score
    Median 5.8 Vs. 4.0, P<0.001

Prognosis of Unoperated Patients



* Excluded MVA ≤2 cm², AR ≥2+, aortic peak velocity ≥2.5 m/s, HCM, endocarditis, concomitant AV, Ao or pericardial surgeries, LVAD or OHT.

Goel SS et al. JACC 2014;63:185–90

First Attempt: Transeptal TMVR

CardiAQ
1st Gen.
Steering Snare

CardiAQ
2nd Gen.

2012	2013	2014	2015	2016	2018	2020

Tendyne

Tiara

Fortis

Intrepid

Navigate

Highlife

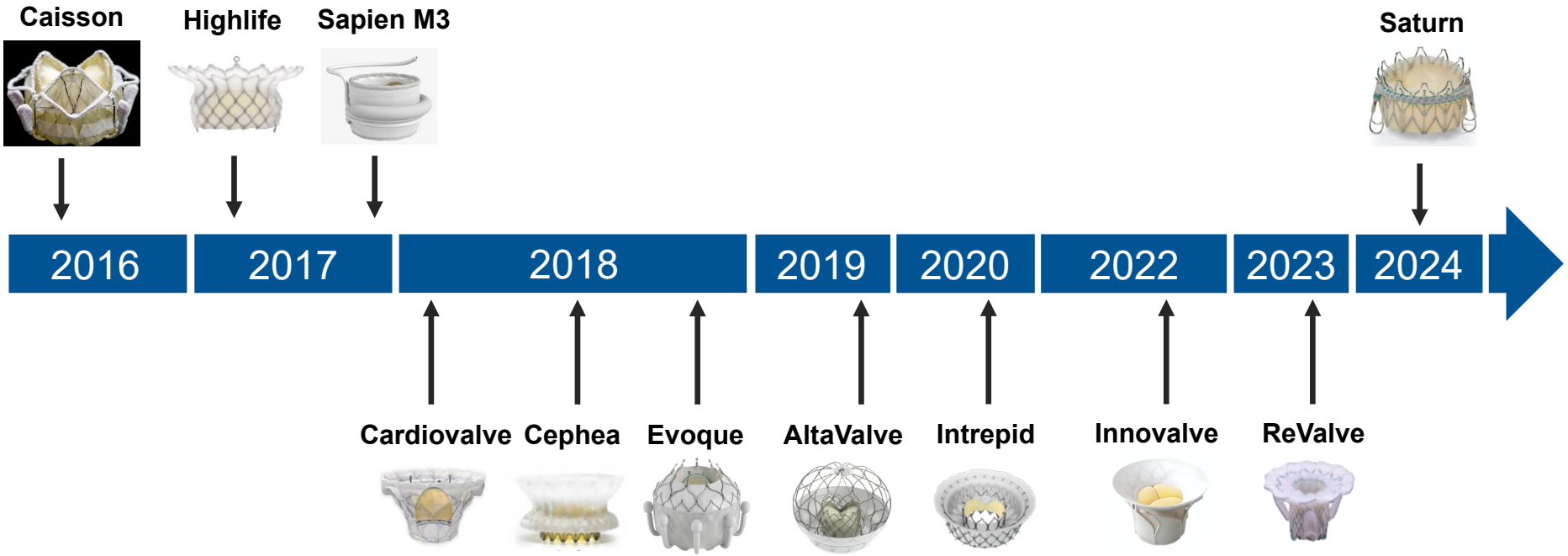
AltaValve

Tendyne CE Mark

Saturn

Trans-Apical TMVR = Feasibility of Delivery

Multi-Step TMVR = Decrease Catheter Profile



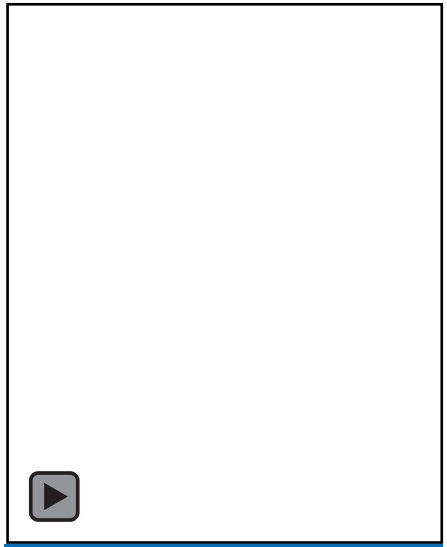
Single-Step TMVR = Procedural Simplification

Ascione G, Granada JF (Submitted)

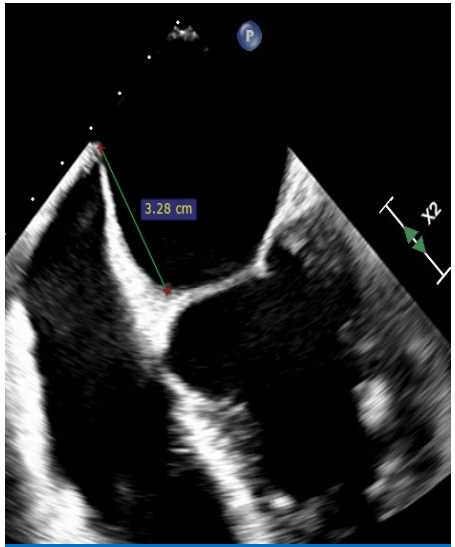
Early Cephea™ Gen 3 Clinical Experience

South America Feasibility Study

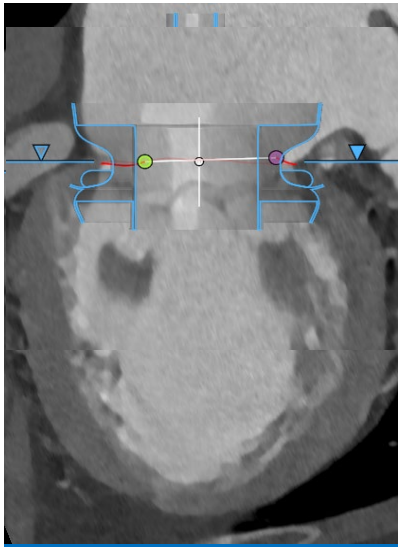
Age	80
Gender	F
MV Disease	4+ SMR
LVEF	32%
LVEDD	5.7 cm
MVA	2.5 cm^2
NYHA	II
STS-PROM	3.3



LOW EF
Hemodynamic Stability



LOW SEPTAL HEIGHT
Depth Control



HIGH PAPILLARY
Precise Delivery

c/o Sandoval J. Instituto Nacional del Torax (Santiago, Chile)

Cephea™ Gen 3: Capsule Separation

Cephea™ Gen 3: Trajectory and Depth Correction

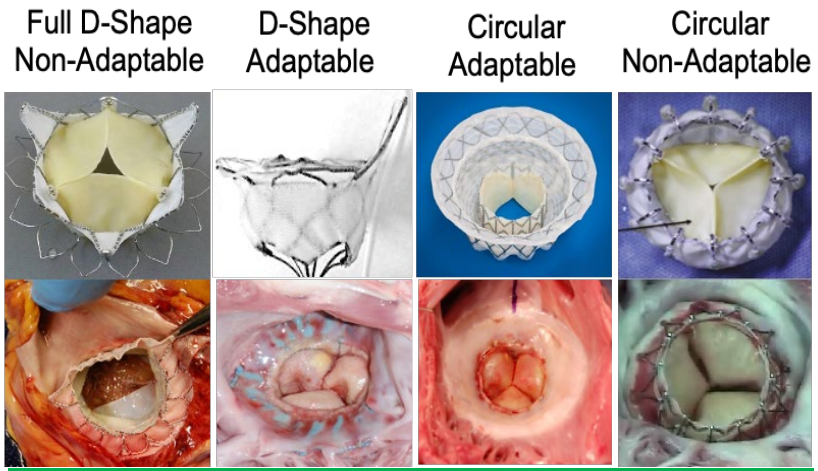
Cephea™ Gen 3: Second Position

Cephea™ Gen 3: Valve Deployment

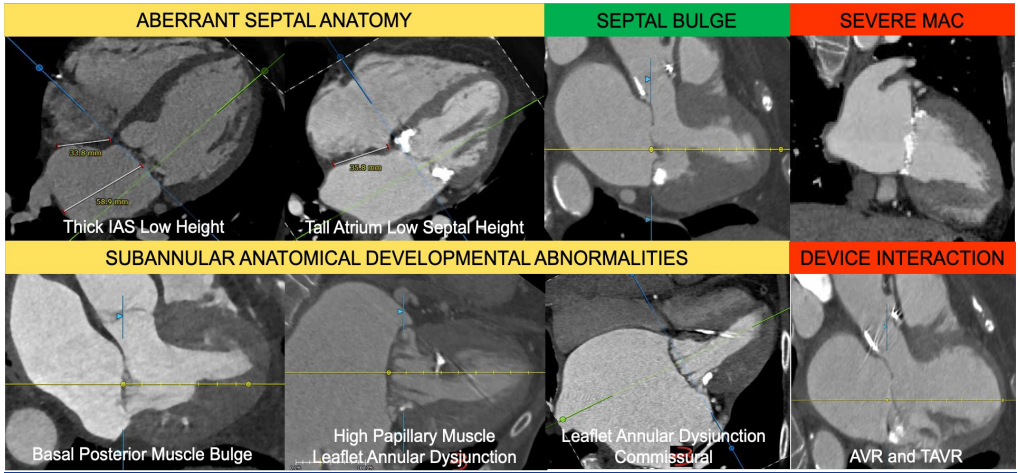
Cephea™ Gen 3: Final Result

High Screen Failure and Rejection Rates

The Achilles Heel of the TMVR Field



The Design Concept:
Ideal Anatomical Conditions

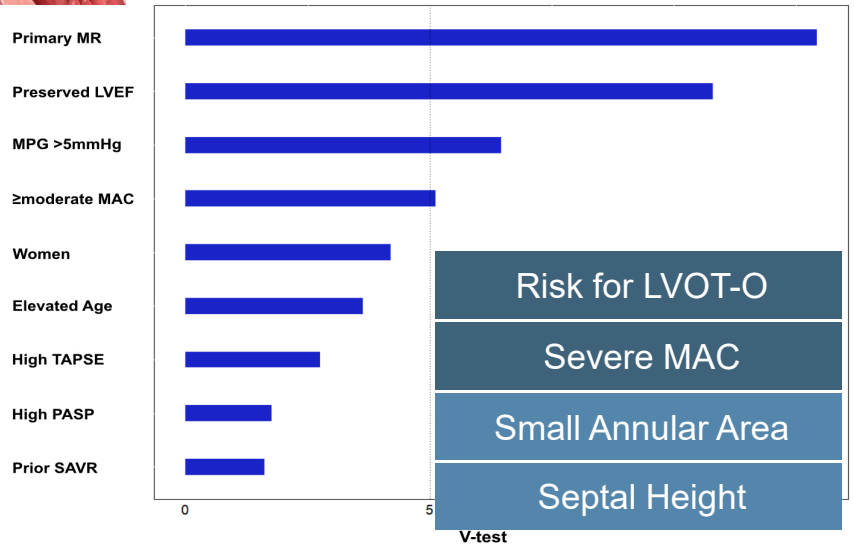


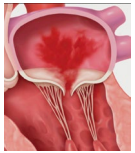
The Final Result:
Anatomy-Device Design Mismatch

Why Are TMVR Candidates Rejected?

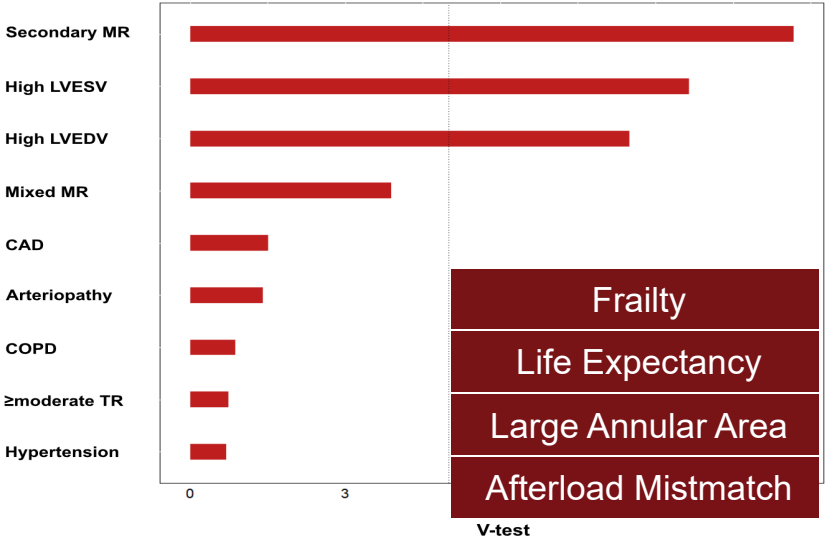
Phenotypic Clustering Analysis (CHOICE-MI Registry)

2/3 of Screen Failures: Anatomical Exclusions



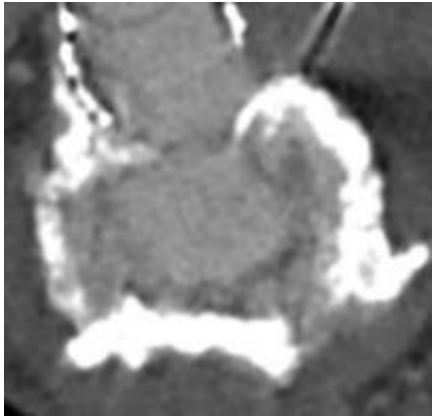


1/3 of Screen Failures: Clinical Reasons (Frailty)



c/o Sebastian Ludwig, ESC 2023

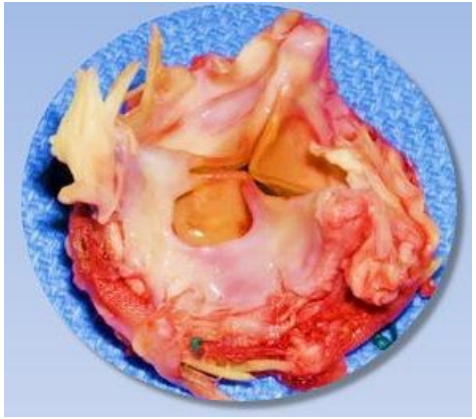
MR Patients Considered for TMVR Display Complex Mitral Valve Features



Severe MAC

Multiple Cleft Leaflets

Multiple MR Jets

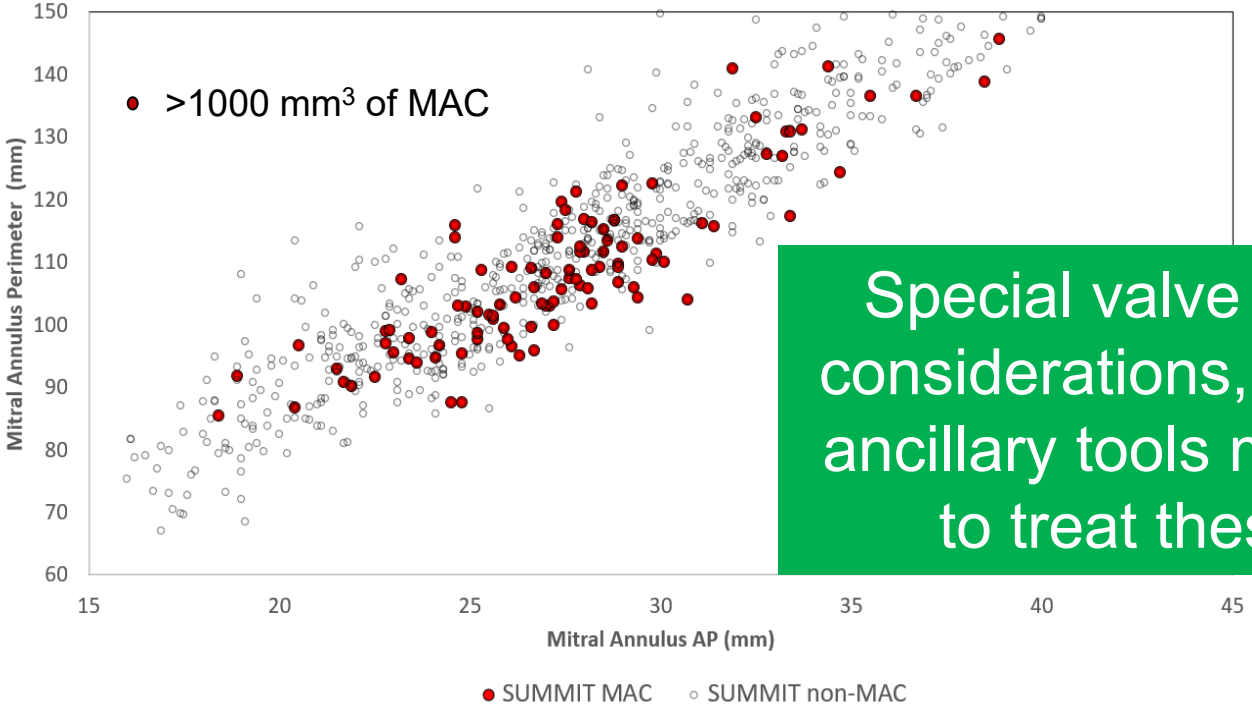


Bioprosthetic Failures

Special Frame Design Considerations Are Needed!

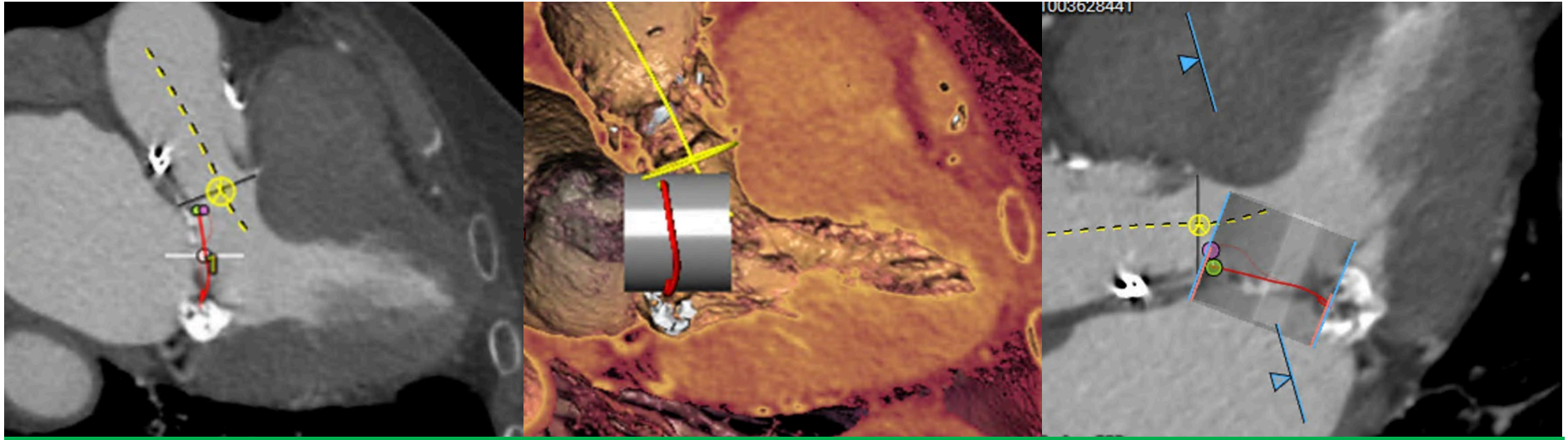
Severe MAC Prevalence in the SUMMIT Trial

~1/3 of All Screened Patients



Special valve sizes, design considerations, and the use of ancillary tools may be needed to treat these patients

The Risk of LVOT-O Remains High in Specific Patient Subsets (i.e., MAC)



Electrosurgery will play a major role in these patients!

Impact of TA Access in Clinical Outcomes

	TA Tendyne EU Experience[1] (195 pts)	TA Intrepid[2] (252 pts)	TS Intrepid[3] (33 pts)
Procedural Success	94.9%	98.4%	93.9%
Disabling Stroke	4.1%	3.6%	0%
Major Bleeding	14%	27%	30.9%
30-Day Mortality	9.3%	13.1%	0%
1-Year Mortality	28.6%	27.3%	6.7%
1-Year HFH Rate	25.4%	26.1%	6.7%
NYHA Class I or II (Baseline vs 1-Year)	22.6% vs 82.5%	19.4% vs 89.1%	30% vs 92%

[1]Hell MM. JACC Intv. 2024, [2]Bapat V. JACC Intv. 2024, [3]Zahr F. JACC Intv. 2023.

EFS TMVR Experience: Procedural Data

	AltaValve (30 pts)	Cephea (24 pts)	Eos (60 pts)	HighLife (30 pts)	Innovalve (45 pts)	Intrepid (33 pts)	M3 (35 pts)
Technical Success	29 (97)	23 (95.8)	60 (100)	27 (90)	43 (95.6)	31 (93.9)	31 (88.6)
In-hospital mortality	0	0	0	0	0	0	0
Device-Related Complications	N/A	1 (4.2)	0	1 (3.3)	0	1 (3.1)	0
LVOT Obstruction	0	2 (8.3)	1 (1.7)	0	0	1 (3.1)	N/A
Conversion to Surgery	1 (3)	1 (4.2)	0	1 (3.3)	N/A	1 (3.1)	0
ASD Closure Performed	N/A	3 (12.5)	2 (3.3)	0	8 (18)	24 (75)	1 (2.9)
Major Access Site Complication	0	0	0	2 (6.7)	0	8 (24.2)	0
≥ Major Bleeding	0	0	N/A	4 (13.3)	3 (6.7)	9 (27.3)	0
Disabling Stroke	0	0	0	0	0	0	N/A

Ascione G, Granada JF, In-Preparation

EFS TMVR Experience: 30-Day Results

	AltaValve (30 pts)	Cephea (24 pts)	Eos (60 pts)	HighLife (30 pts)	Innovalve (45 pts)	Intrepid (33 pts)	M3 (35 pts)
All-Cause Mortality	3 (10)	1 (4.2)	3 (5)	3 (10)	2 (4.5)	0	1 (2.9)
CV Mortality	2 (7)	1 (4.2)	3 (5)	1 (3)	N/A	0	N/A
Disabling Stroke	0	0	0	1 (3)	0	0	1/35 (2.9)
≥ MVARC Major Bleeding	N/A	0					0
Major Vascular Complications	N/A	N/A	N/A	3 (10)	0	8 (24.2)	0
NYHA class I or II	29 (96)	13 (65)	41 (68.5)	22 (76)	28 (67)	25 (83)	18 (54.9)
MR ≥2 +	0	0	1 (1.7)	0	1 (2)	0	1 (3.1)
PVL ≥2+		0	N/A	0	N/A	0	N/A
Mean MVG, mmHg	4.2	5.5 ± 2.9	3.8 (2.9-5)	4 (3.3-4.9)	N/A	4.9 (3.7-6.7)	5.6 ± 0.4
MV Reintervention	0	0	1 (1.7)	1 (3)	N/A	1 (3)	2 (5.8)

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EFS TMVR Experience: 1-Year Results

	AltaValve* (30 pts)	Eos (60 pts)	HighLife (30 pts)	Intrepid (33 pts)
All-Cause Mortality	4 (14)	12 (20.3)	5 (17)	2 (6.7)
CV Mortality	2 (7)	10 (16.9)	2 (7)	1 (3)
HFH	N/A	16 (27.1)	7 (23)	2 (6.7)
Disabling Stroke	0	1 (1.7)	1 (3)	0
MVARC-Major Bleeding	N/A	18 (30.5)	7 (22)	10 (30.9)
NYHA Class I or II	28 (94)	52 (86.8)	17 (78)	22 (92)
MR ≥ 2	0	0	0	0
PVL ≥ 2	N/A	N/A	1 (4)	0
Mean MVG, mmHg	4.2	3.5 (2.5 - 4.8)	4 (3.3-4.9)	4.6 (3.9 – 5.3)
MV Reintervention	0	3 (5.1)	1 (3)	1 (3)

*6-Month results

Ascione G, Granada JF, In-Preparation

TMVR Design Concepts Continue to Evolve

SINGLE STEP (ANNULAR)

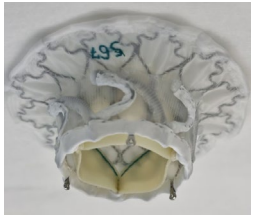
INTREPID

CEPHEA

SINGLE STEP (SUB-ANNULAR)

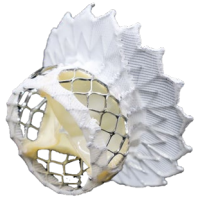
EVOQUE

REVALVE



INNOVALVE

MULTIPLE STEP (SUB-ANNULAR)



HIGHLIFE

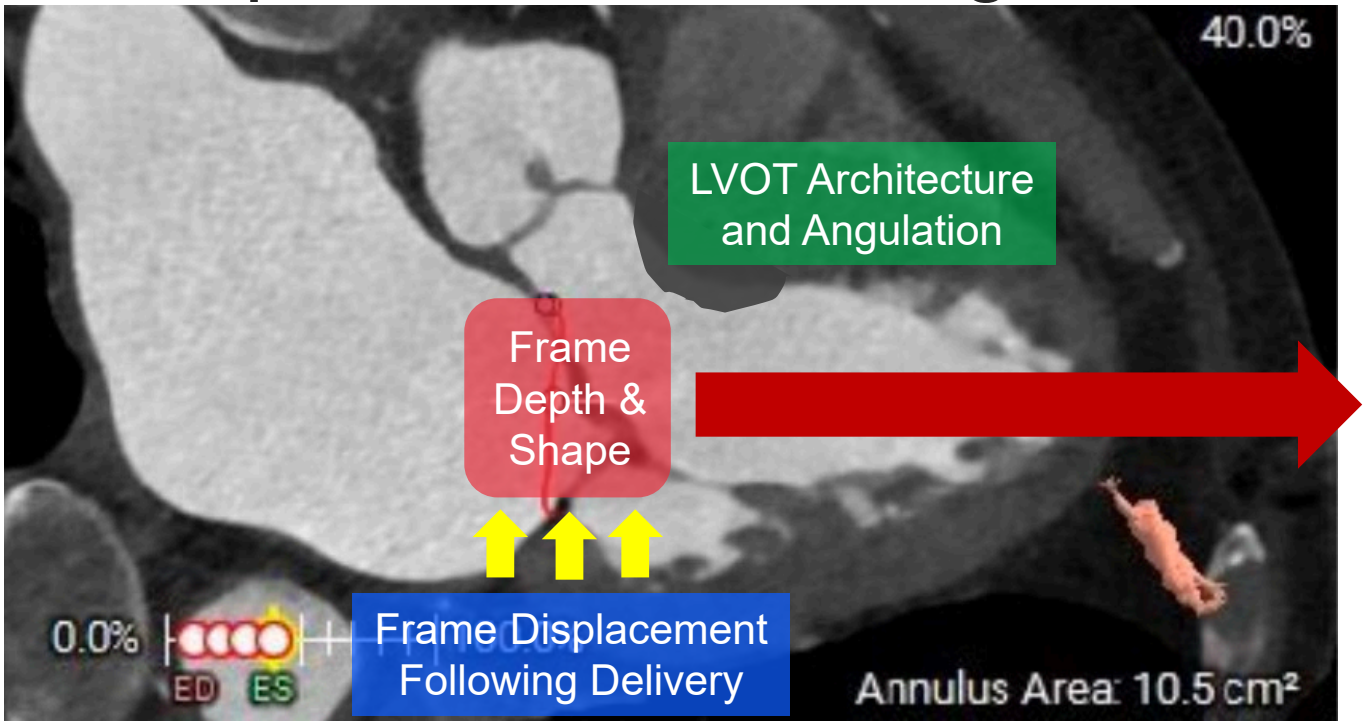
SAPIEN M3

TIOGA

INNOVHEART

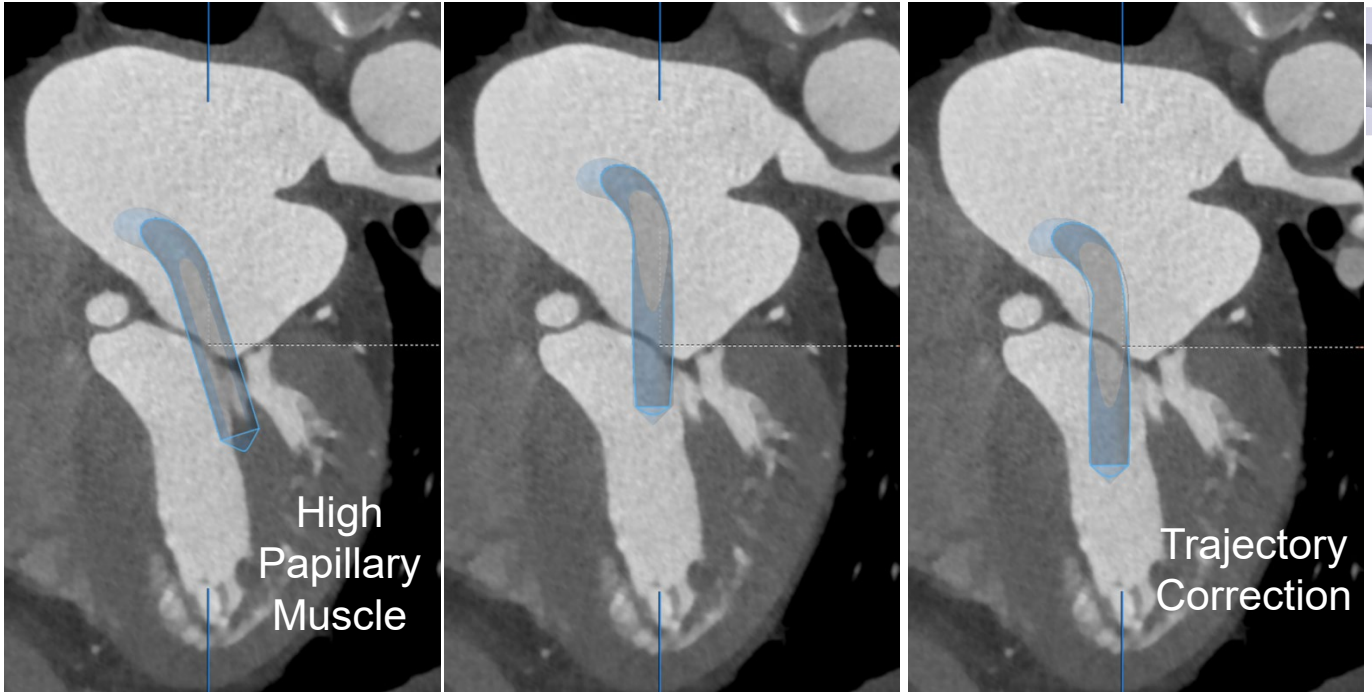
LVOT-O Risk in TMVR is Multi-Factorial

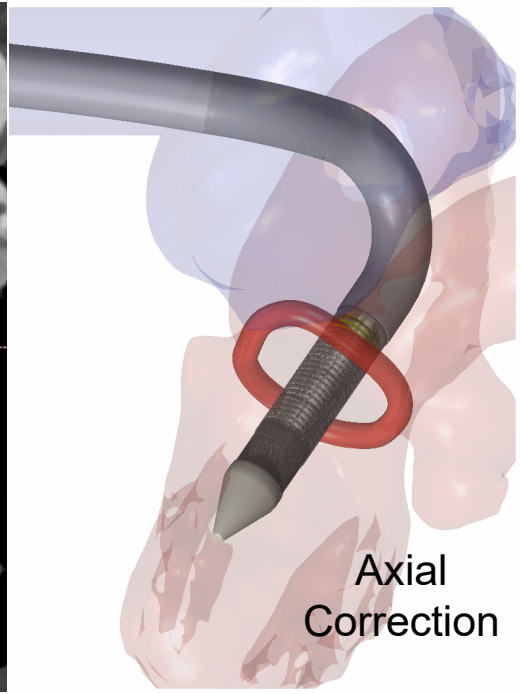
Impact of Frame Design and Anchoring



New Gen. TMVR Frame Designs

Precise Valve Positioning and Axial Correction is Needed in Complex Mitral Cases

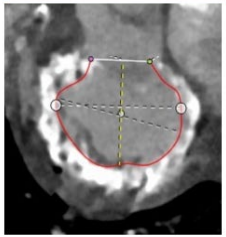




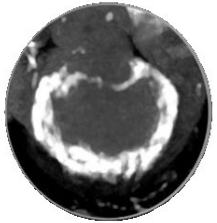
Slide c/o Abbott Vascular (3rd Gen. Cephea TMVR System)

Evolution of Adjunctive Interventional Tools Enables the Treatment of Complex Anatomies

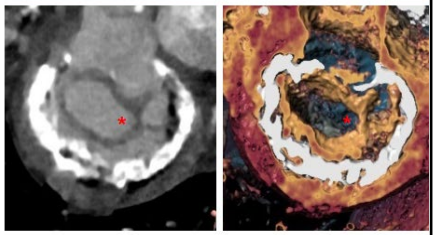
Work-Up



A 10.8 cm² – P 125.6 mm
AP 32.6 mm – CC 41.6 mm

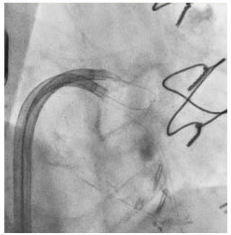


Severe MAC

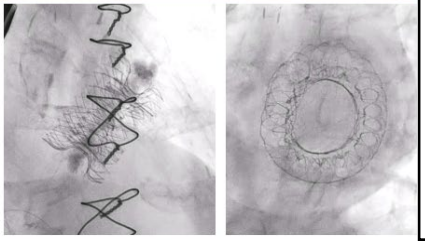


* Surgical Edge-to-Edge Repair

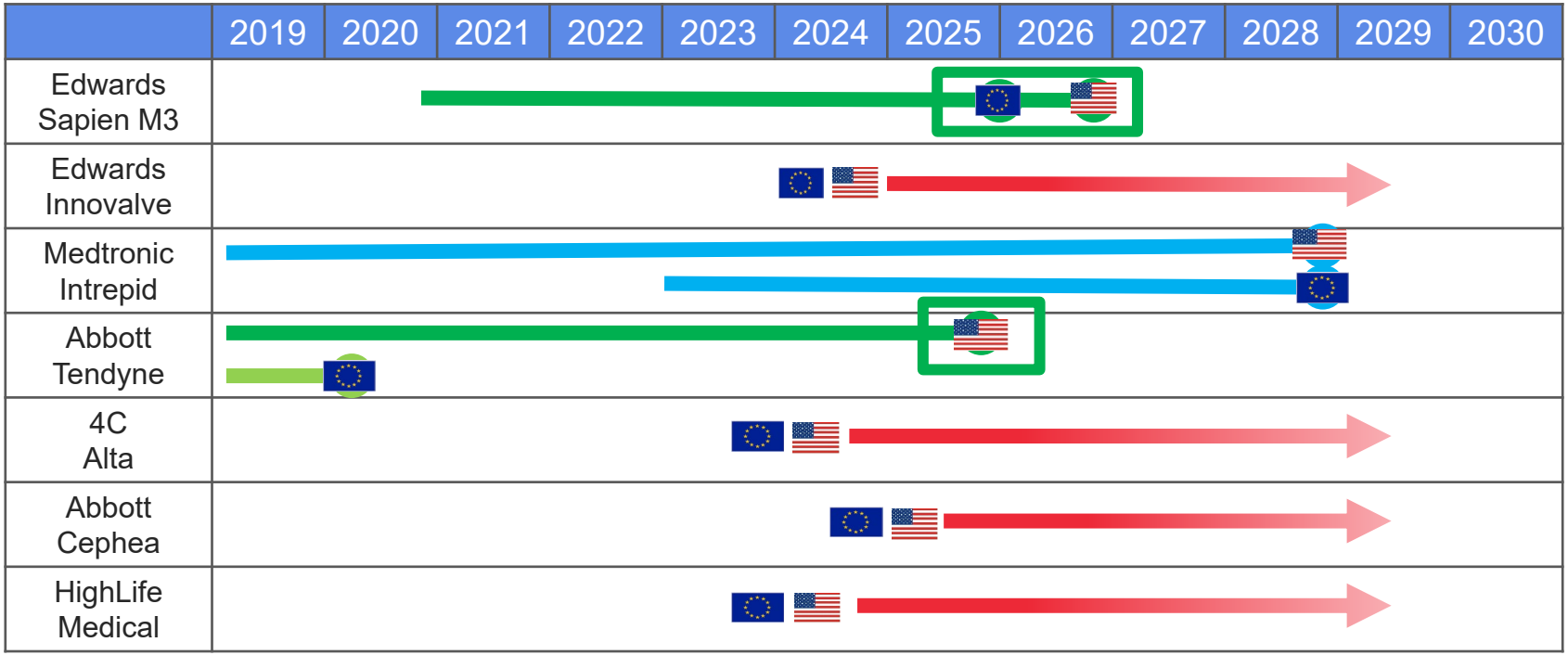
Suture Laceration



TMVR - CEPHEA



Pivotal Trial Timeline* in Major TMVR Programs



*Projected dates based on public data

Where Are We in 2025 in the TMVR Field?

- Transfemoral TMVR is a reproducible and safe procedure, with surgical conversion rates below 3%.
- Procedural and long-term outcomes are improving; mortality remains closely linked to patient selection.
- LVOT obstruction remains a key screening barrier; design enhancements and electrosurgery may broaden eligibility
- A single TMVR solution may not suit all; diverse designs are needed to address real-world anatomical variability