SOLACI SOCIME'25
MEXICO CITY

AMOR·SCIENTIA·QVE·INSERVIANT·CORDI
MEXICO
INSTITVTO·N·DE
CARDIOLOGIA
IGNACIO·CHAVEZ

# ADVANCES IN MITRAL VALVE-IN-VALVE

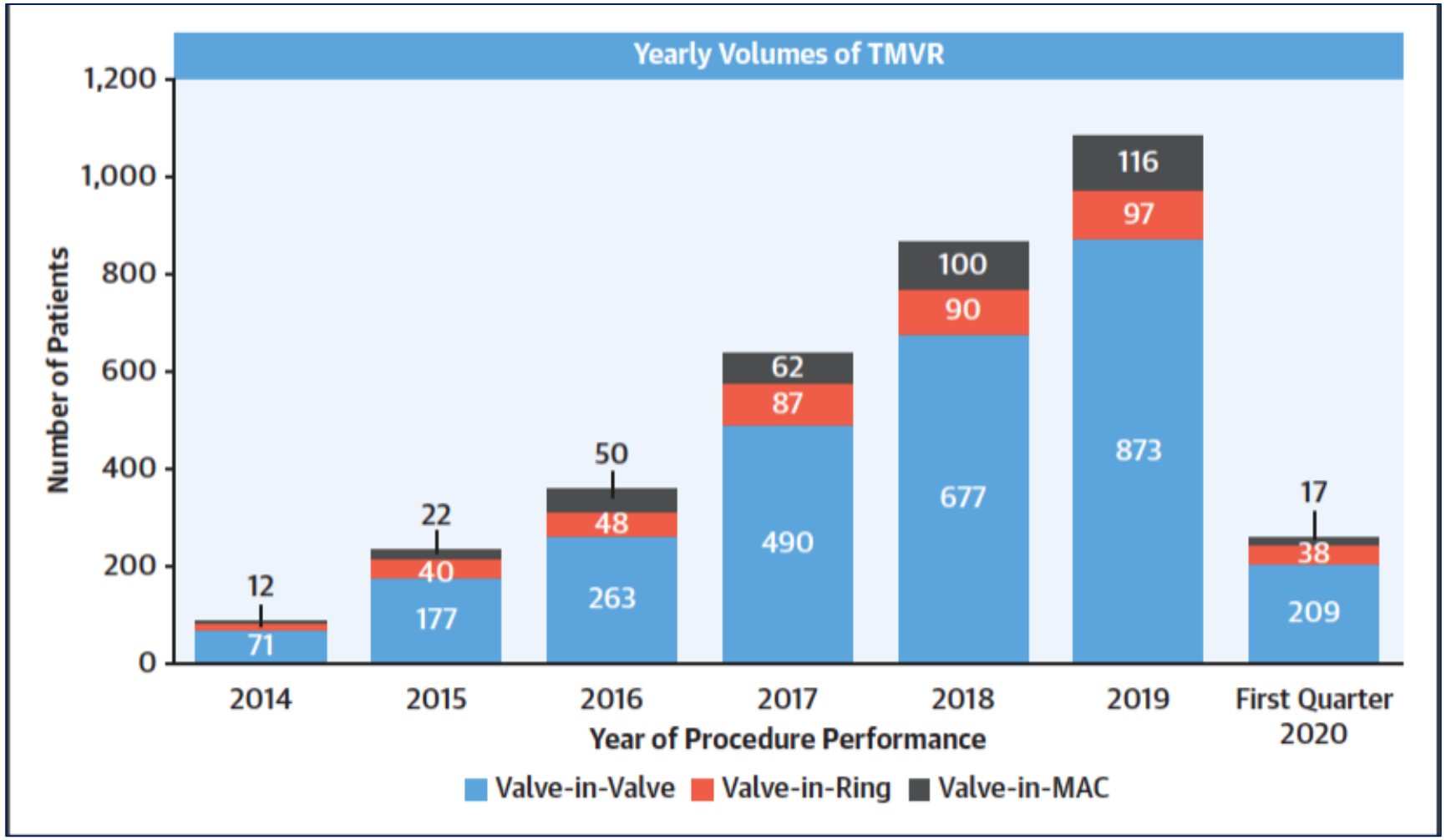
**Guering Eid Lidt, MD, FSCAI, FESC**
**Head of Department of Interventional Cardiology**
**Professor of Interventional Cardiology-UNAM**
**Instituto Nacional de Cardiología Ignacio Chávez**

SOLACI
SOCIME

# MITRAL VALVE-IN-VALVE

1. CONTEMPORARY OUTCOMES AND TRENDS.
2. PREPROCEDURAL PLANNING.
3. PROCEDURAL TECHNIQUE.
4. POSTDEPLOYMENT ASSESSMENT.
5. MID-TERM OUTCOMES.
6. REMAINING ISSUES.

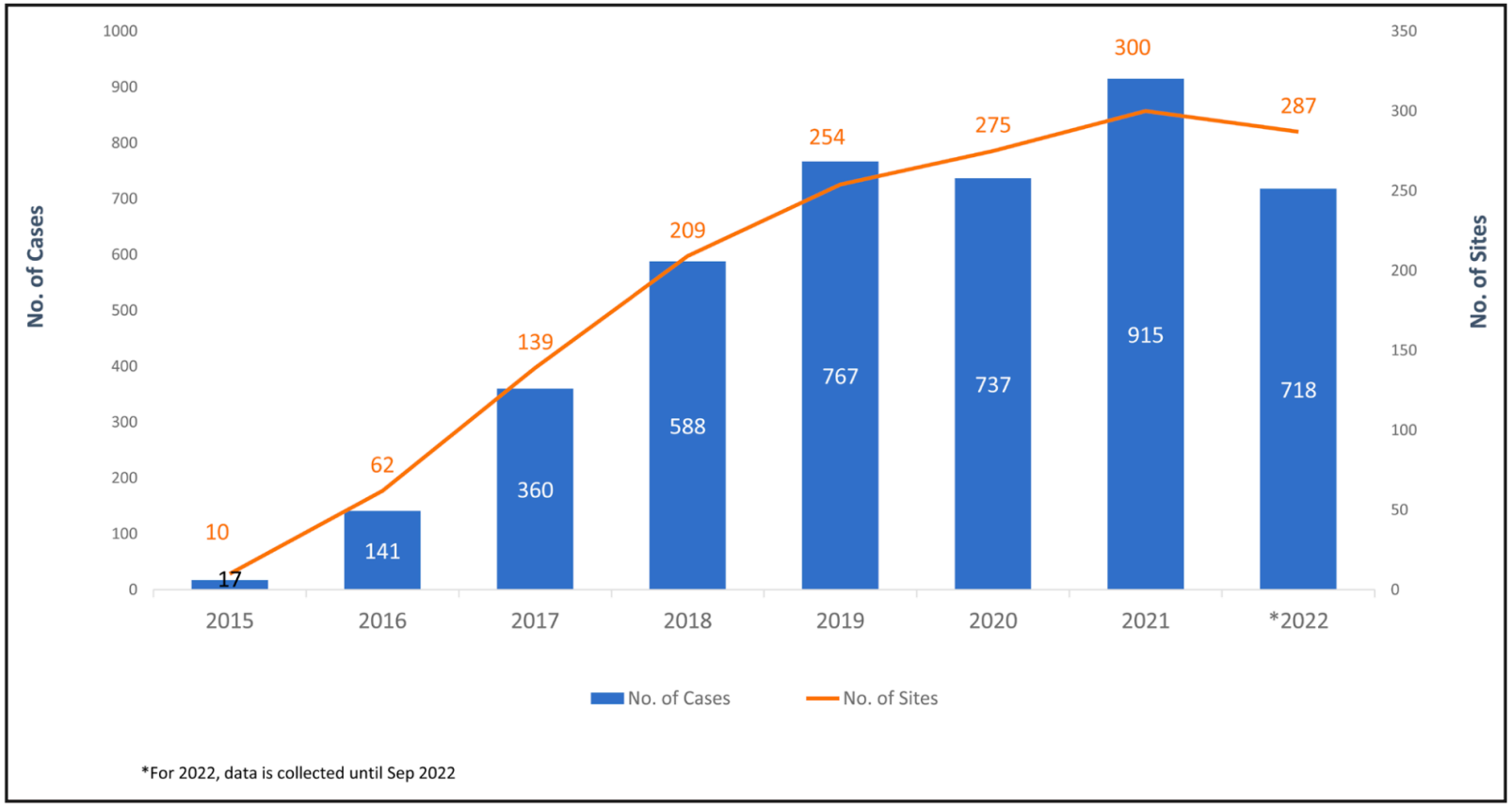
# STS-ACC TVT Registry




Mack M, et al. J Am Coll Cardiol 2021;78:2326-2353.

# Temporal trends in MViV in the USA

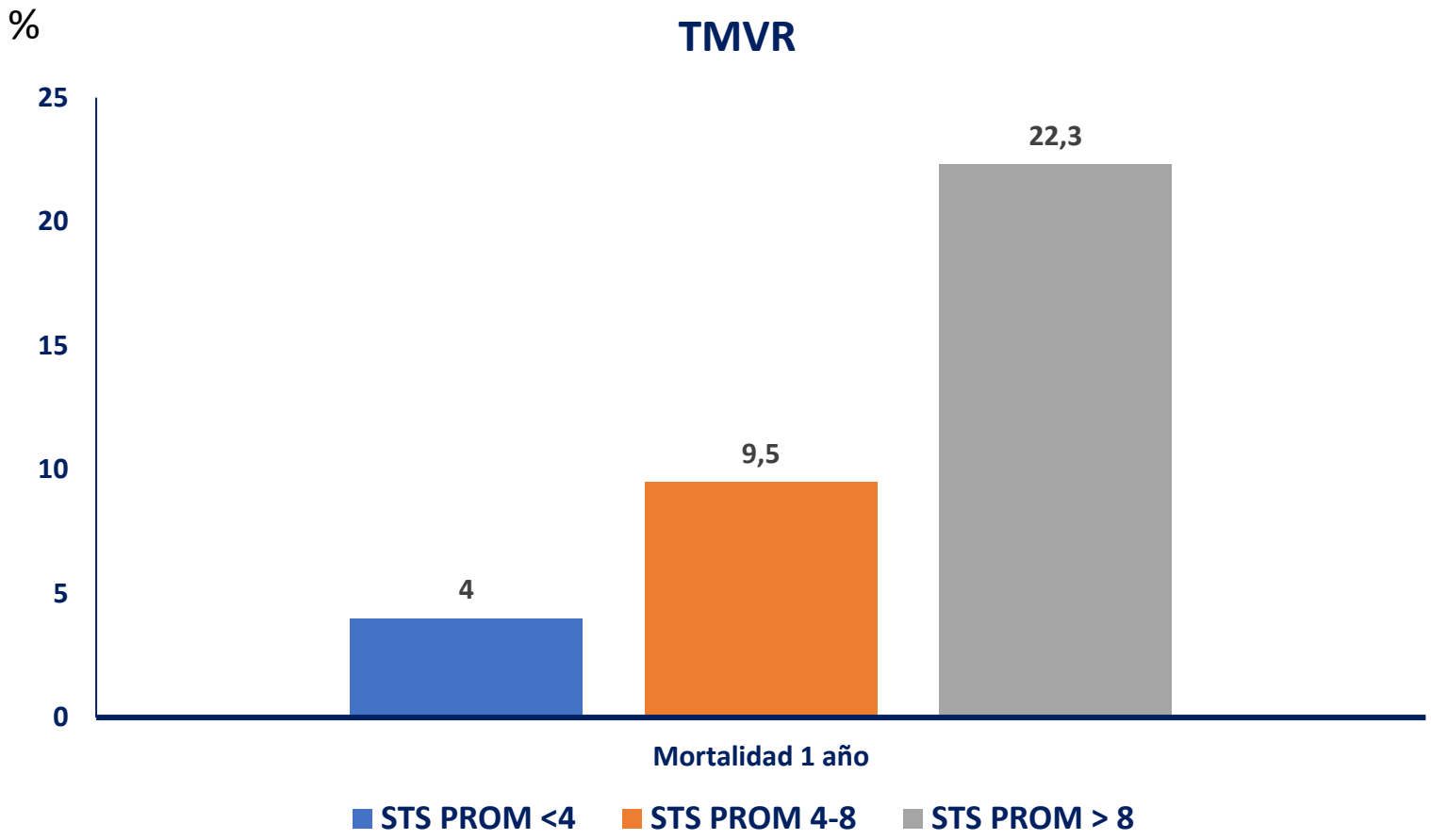
# TVT Registry




Goel K, et al. Circulation 2024;150:1493-1504.

# Mitral Valve-in-V

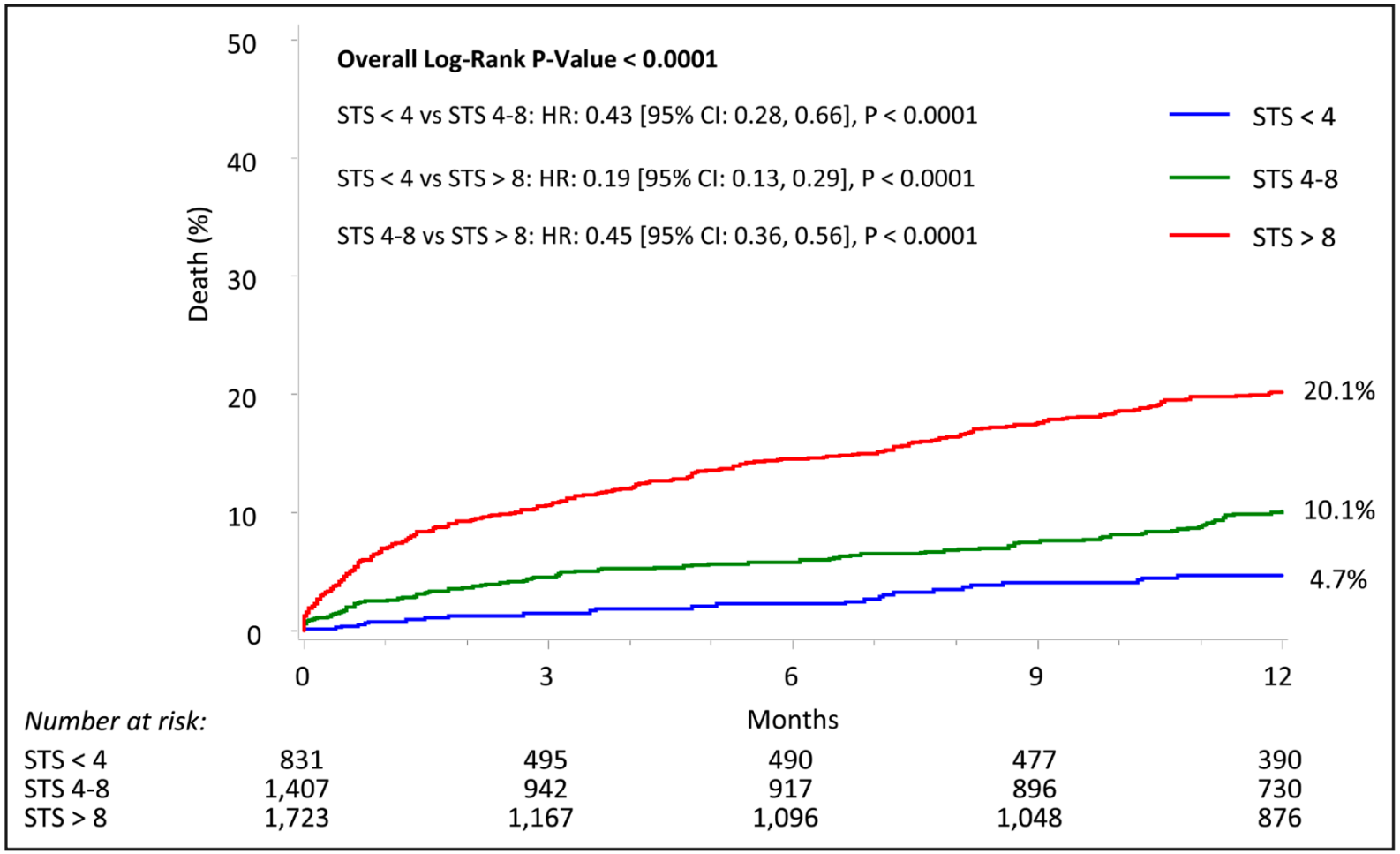
## Mortality according to STS PROM.




*JAMA Cardiol*. doi:10.1001/jamacardio.2020.2974
Published online July 29, 2020.

# One-year all-cause mortality rates by risk

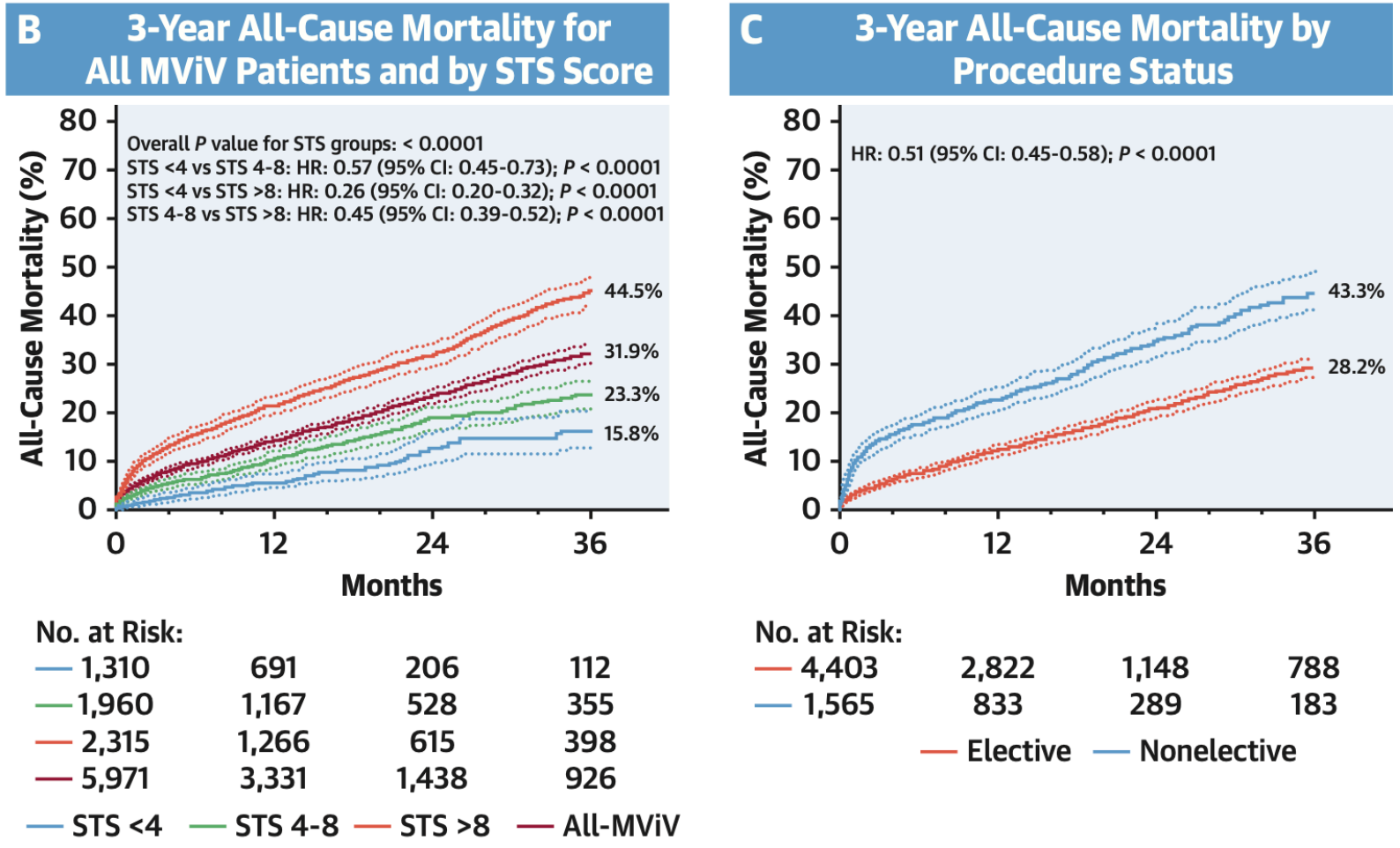
## TVT REGISTRY




Goel K, et al. Circulation 2024;150:1493-1504.

# TVT REGISTRY

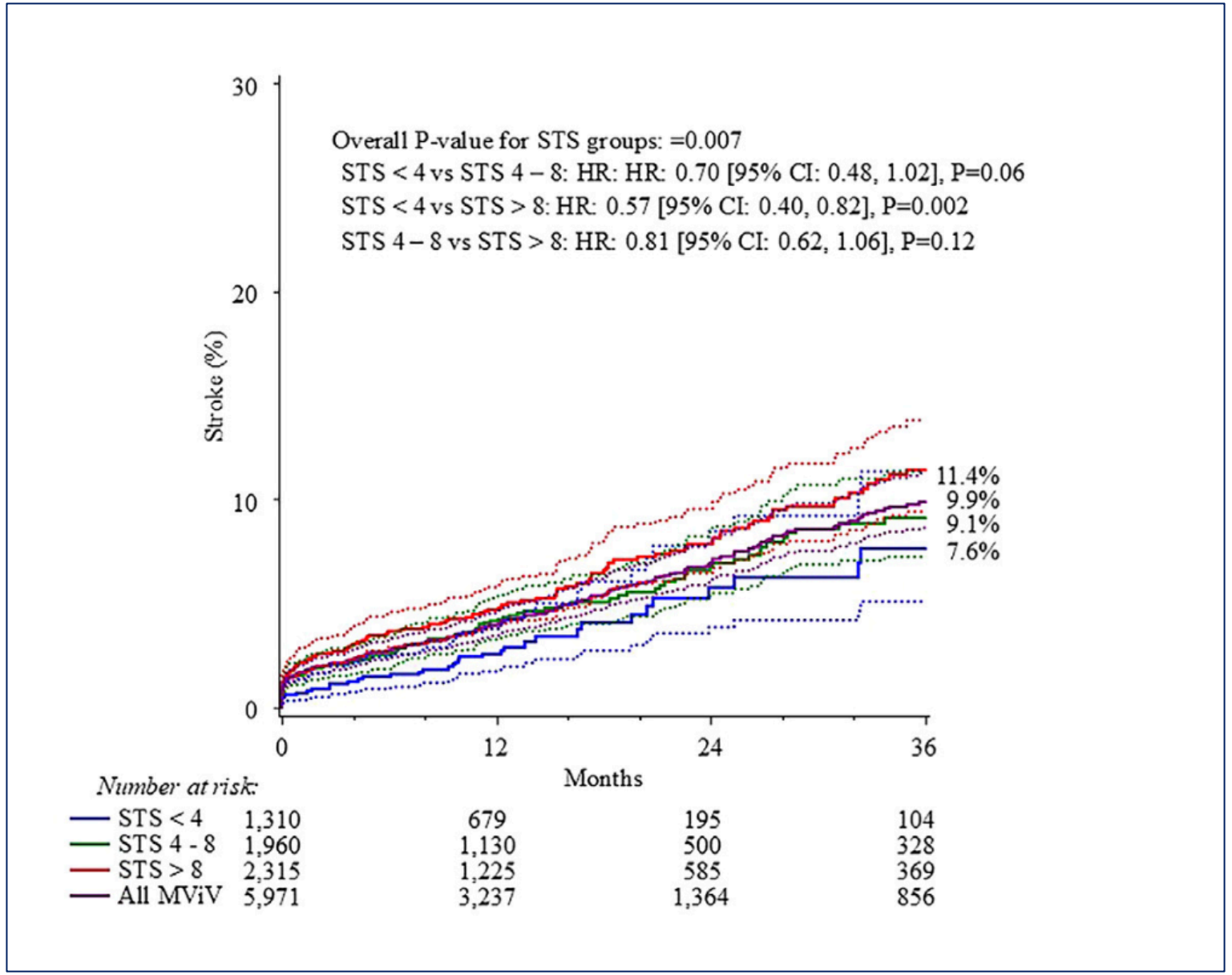
## Global Mortality STS Score and Procedural Status




Eleid MF, et al. JACC Cardiovasc Interv 2025;18:1454-1466.

# TVT REGISTRY

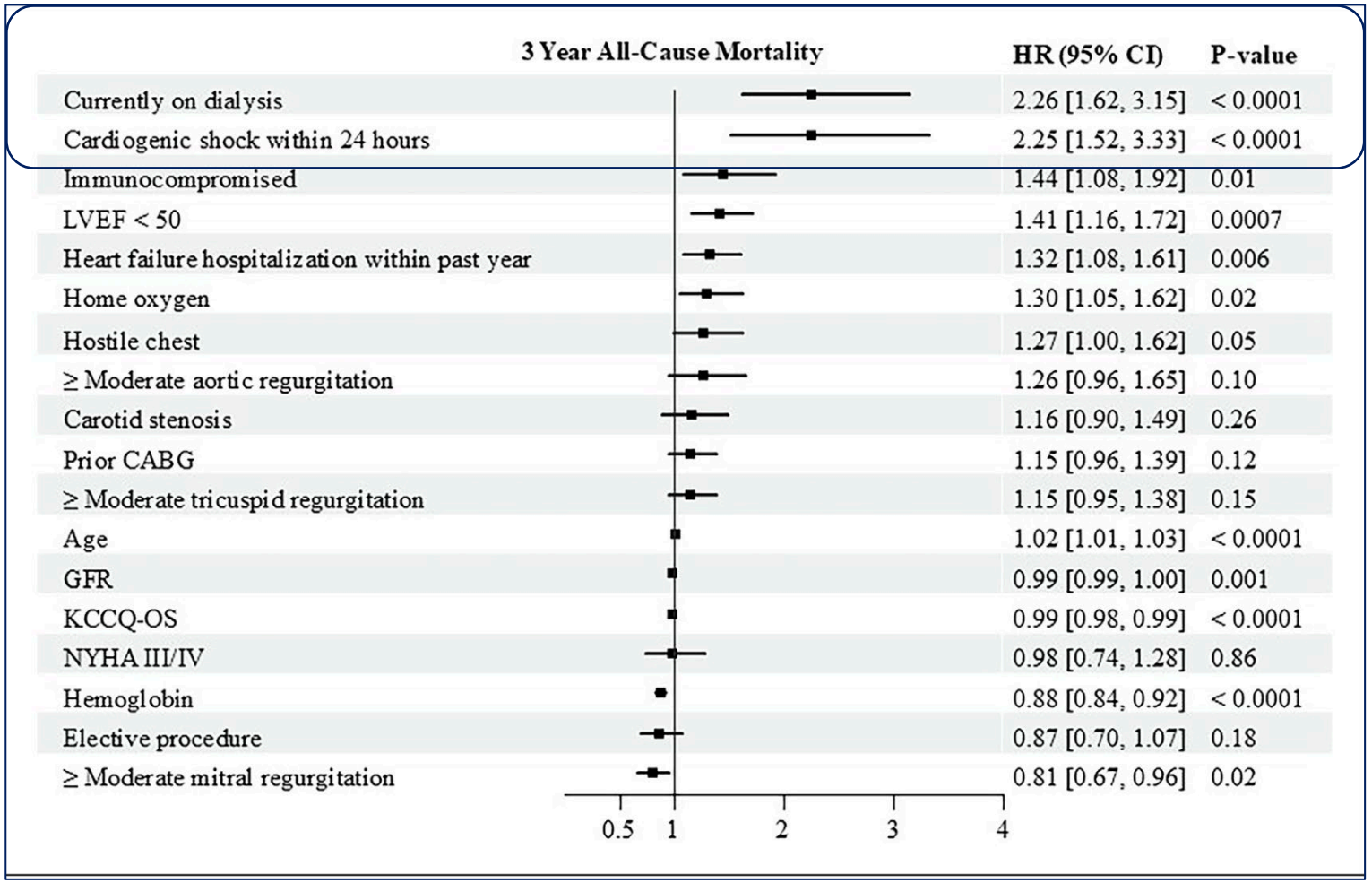
## Stroke outcomes (Overall cohort) according to STS Score.




Eleid MF, et al. JACC Cardiovasc Interv 2025;18:1454-1466.

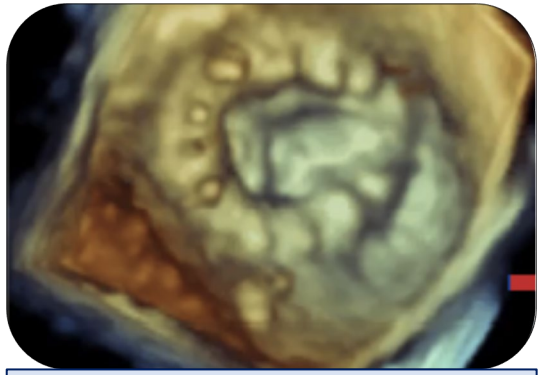
# Predictor of 3-year All-Cause Mortality

Eleid MF, et al. JACC Cardiovasc Interv 2025;18:1454-1466.

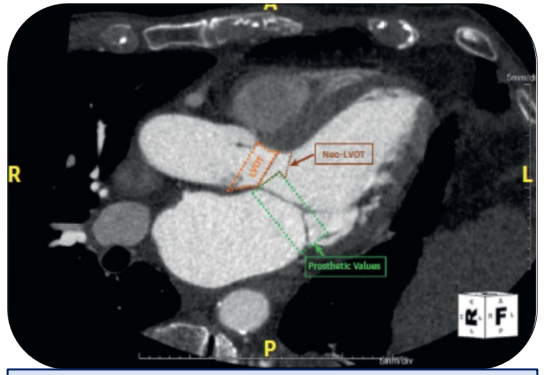


# Preprocedural planning Mitral valve-in-Valve

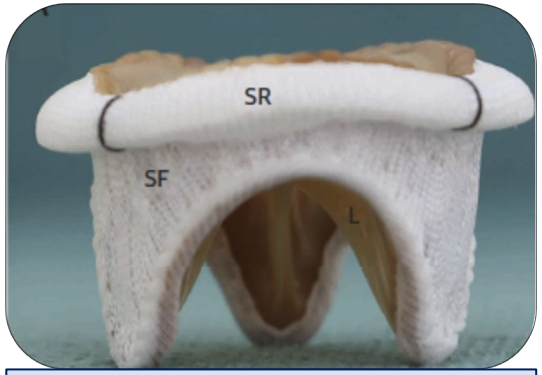
**4 major key points of analysis**



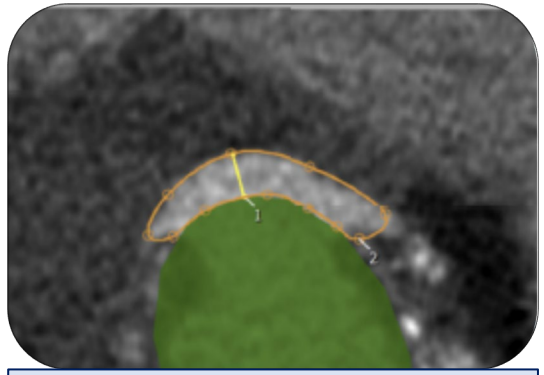
**1. Mechanisms of bioprosthesis failure**




**2. Morphology of the mitral valve.**




**3. Characteristics of the SHV.**



**4. Evaluation of major risk.**

Guering Eid-Lidt, MD, FSCAI, FESC- Head of Department of Interventional Cardiology. Instituto Nacional de Cardiología Ignacio Chávez. 2025

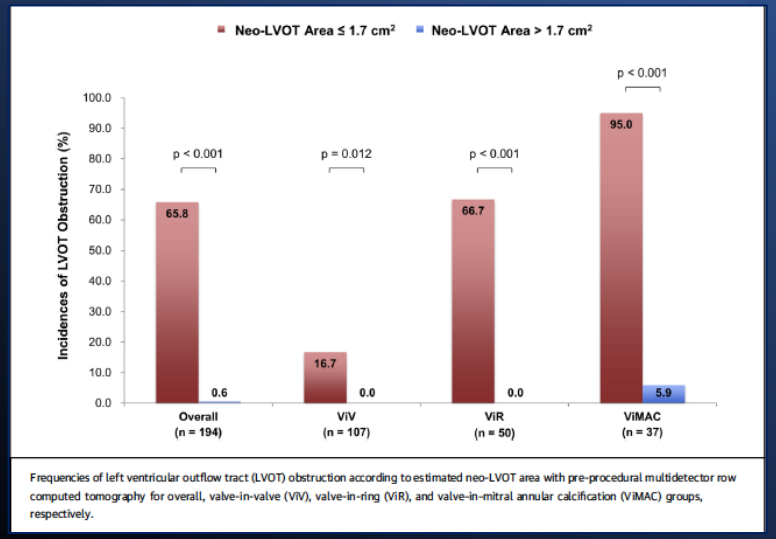
# Contraindications for transeptal Mitral Valve-in-Valve

| Absolute contraindications | Relative contraindications |
|---|---|
| • Infective endocarditis | • Narrow LVOT |
| • Dehiscence of the bioprosthesis | • Bioprosthetic PVLs |
| • Bioprosthetic thrombosis | • Thrombus within the right or left atrial cavity |
| • Thrombus at the intra-atrial septum | • Severe patient-prosthesis mismatch |
| • Interrupted IVC | • Prior atrial septal defect repair |
| | • Prior mitral valve repair via a transseptal approach |

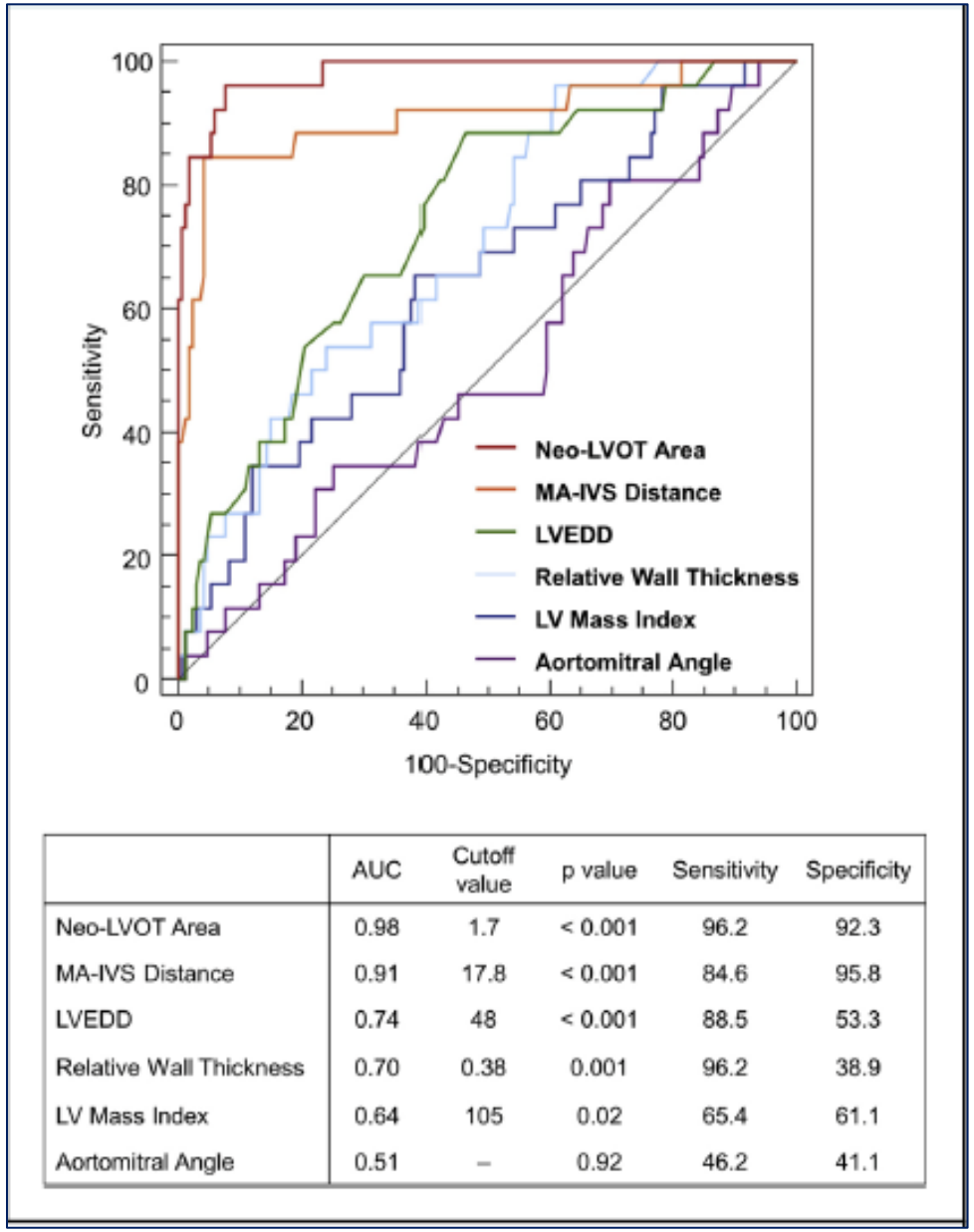
Source: references (8,9). ViV, valve-in-valve; TMVR, transcatheter mitral valve replacement; LVOT, left ventricular outflow tract; PVL, paravalvular leak; IVC, inferior vena cava.

Urena M, et al. J am Coll Cardiol Interv 2017;10:905-919.
Alkhouli M, et al. J Am Coll Cardiol Intv 2016;9:2465-2480.

# Predictors of LVOT obstruction TMVR



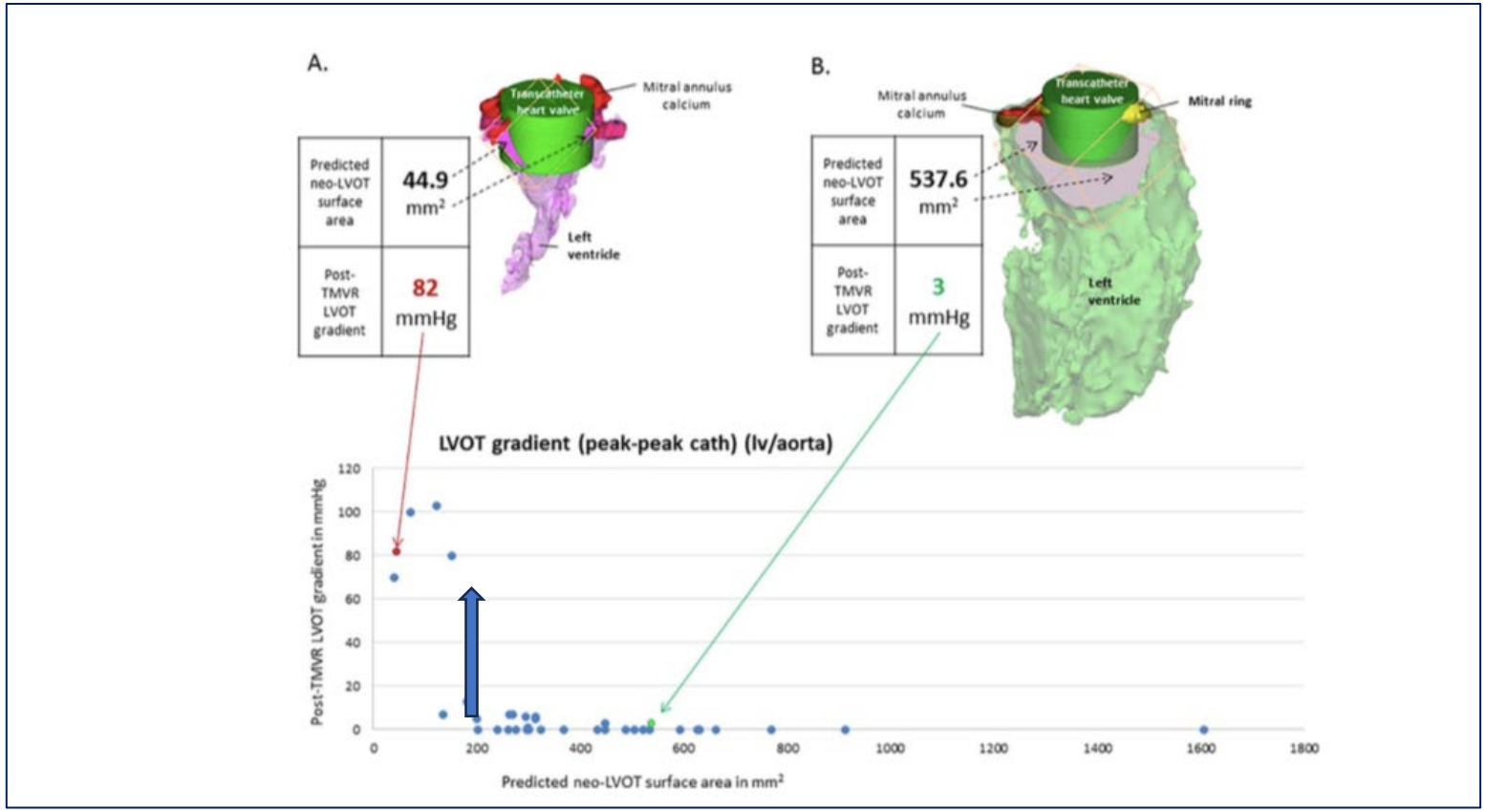

Frequencies of left ventricular outflow tract (LVOT) obstruction according to estimated neo-LVOT area with pre-procedural multidetector row computed tomography for overall, valve-in-valve (ViV), valve-in-ring (ViR), and valve-in-mitral annular calcification (ViMAC) groups, respectively.




| | AUC | Cutoff value | p value | Sensitivity | Specificity |
|---|---|---|---|---|---|
| Neo-LVOT Area | 0.98 | 1.7 | < 0.001 | 96.2 | 92.3 |
| MA-IVS Distance | 0.91 | 17.8 | < 0.001 | 84.6 | 95.8 |
| LVEDD | 0.74 | 48 | < 0.001 | 88.5 | 53.3 |
| Relative Wall Thickness | 0.70 | 0.38 | 0.001 | 96.2 | 38.9 |
| LV Mass Index | 0.64 | 105 | 0.02 | 65.4 | 61.1 |
| Aortomitral Angle | 0.51 | – | 0.92 | 46.2 | 41.1 |

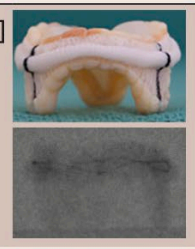
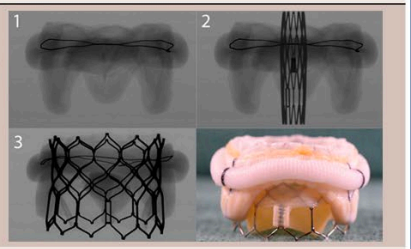
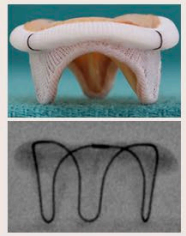
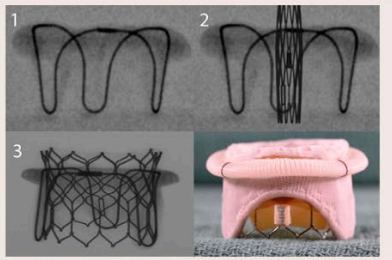
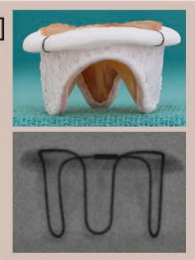
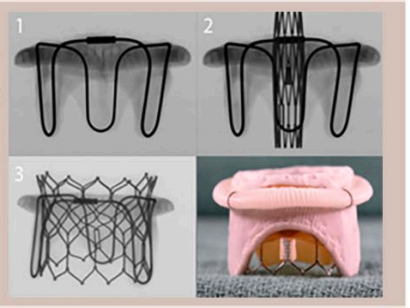
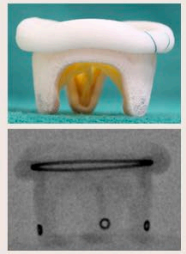
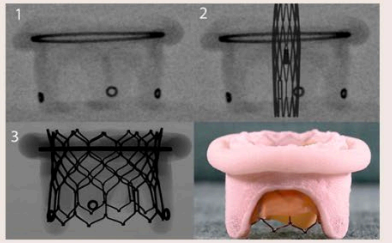
- J Am Coll CardiolIntv 2019;12:182-193.

# Neo-LVOT area and LV-Aorta gradient



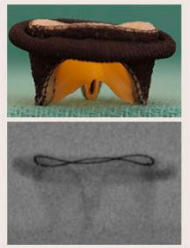
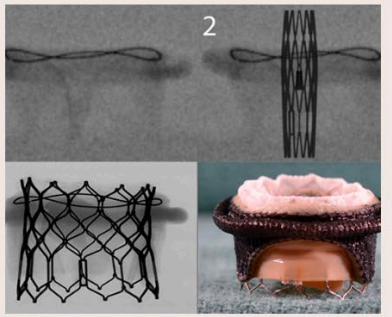
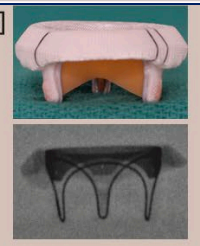
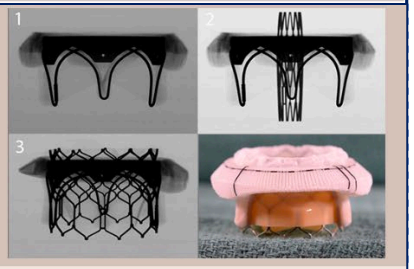
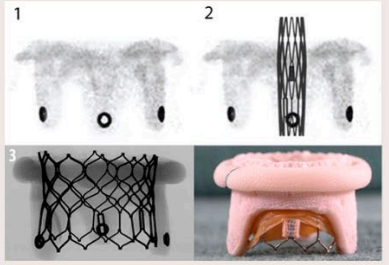

*Guerrero M, et al. Catheter Cardiovasc Interv.* 2018;**92:**379–387.

# Bioprosthetic heart valves used in mitral position. Representation of alignment of THV.

| Name | Type | Fluoroscopic marker for valve positioning | Available sizes [range] | Image | Alignment during VIV using Sapien S3 | VIV deployment |
|---|---|---|---|---|---|---|
| St. Jude Biocor Epic | Porcine leaflets | Sewing ring serves as a marker. The stent posts are not well visualized on fluoroscopy | 5 [25 to 33 mm] |  | Align the base of the central marker with the sewing ring |  |
| Carpentier-Edwards SAV | Porcine leaflets | Stent post is well visualized | 5 [25 to 33 mm] |  | Align the base of the central marker 3–5 mm below the base of the stent frame |  |
| Carpentier-Edwards Standard | Porcine leaflets | Stent post | 6 [25 to 35 mm] |  | Align the base of the central marker 3–5 mm below the base of the stent frame |  |
| Medtronic Hancock II | Porcine leaflets | Sewing ring and the circular markings on the stent post tip are visualized by fluoroscopy | 5 [25 to 33 mm] |  | Align the outflow of the crimped S3 2 mm below the surgical valve circular markers |  |

Agarwal V, et al. Ann Cardiothorac Surg 2021;10:585-604.

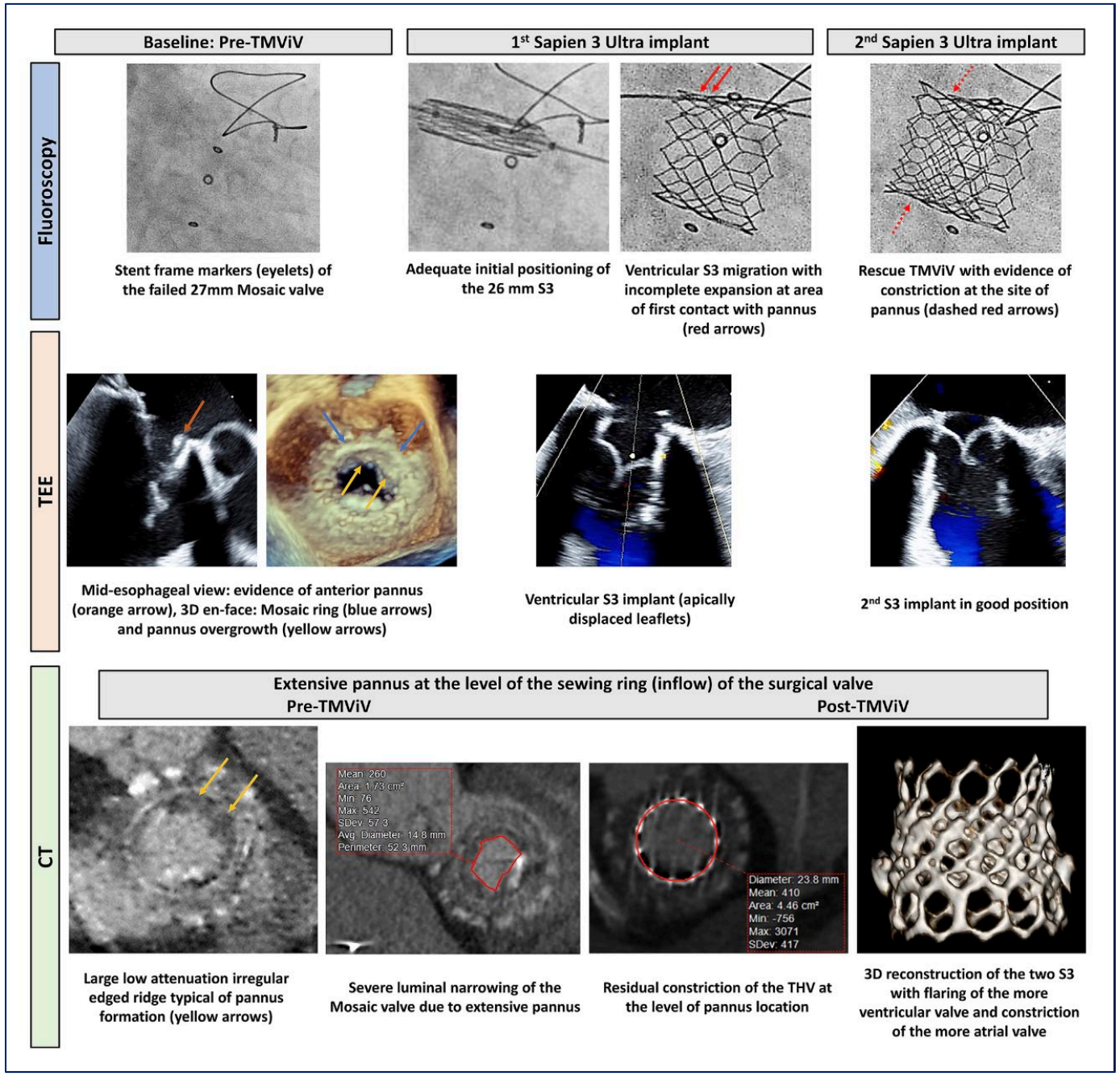
# Bioprosthetic heart valves used in mitral position. Representation of alignment of THV.

| Name | Type | Fluoroscopic marker for valve positioning | Available sizes [range] | Image | Alignment during VIV using Sapien S3 | VIV deployment |
|---|---|---|---|---|---|---|
| Sorin Pericarbon More | Pericardial leaflets | Sewing ring is visualized on fluoroscopy | 8 [19 to 33 mm] |  | Align the base of the central marker with the sewing ring |  |
| Images adapted from VIV application. For optimal valve function the target depth of implantation should not be more than 20% at the atrial aspect. VIV, valve-in-valve. | | | | | | |
| Carpentier-Edwards Perimount Magna | Pericardial leaflets | Distinct stent post. Well visualized on fluoroscopy | 5 [25 to 33 mm] |  | Align the base of the central marker 3–5 mm below the base of the stent frame |  |
| Medtronic Mosaic | Porcine leaflets | Circular markings on the stent post tip are visualized on fluoroscopy | 5 [25 to 33 mm] |  | Align the outflow of the crimped S3 2 mm below the surgical valve circular markers |  |

Agarwal V, et al. Ann Cardiothorac Surg 2021;10:585-604.

Jelisejevas J, et al. JACC Cardiovasc Intv 2024;17:574-576.

# Mitral Valve-in-Valve in the presence of inflow pannus

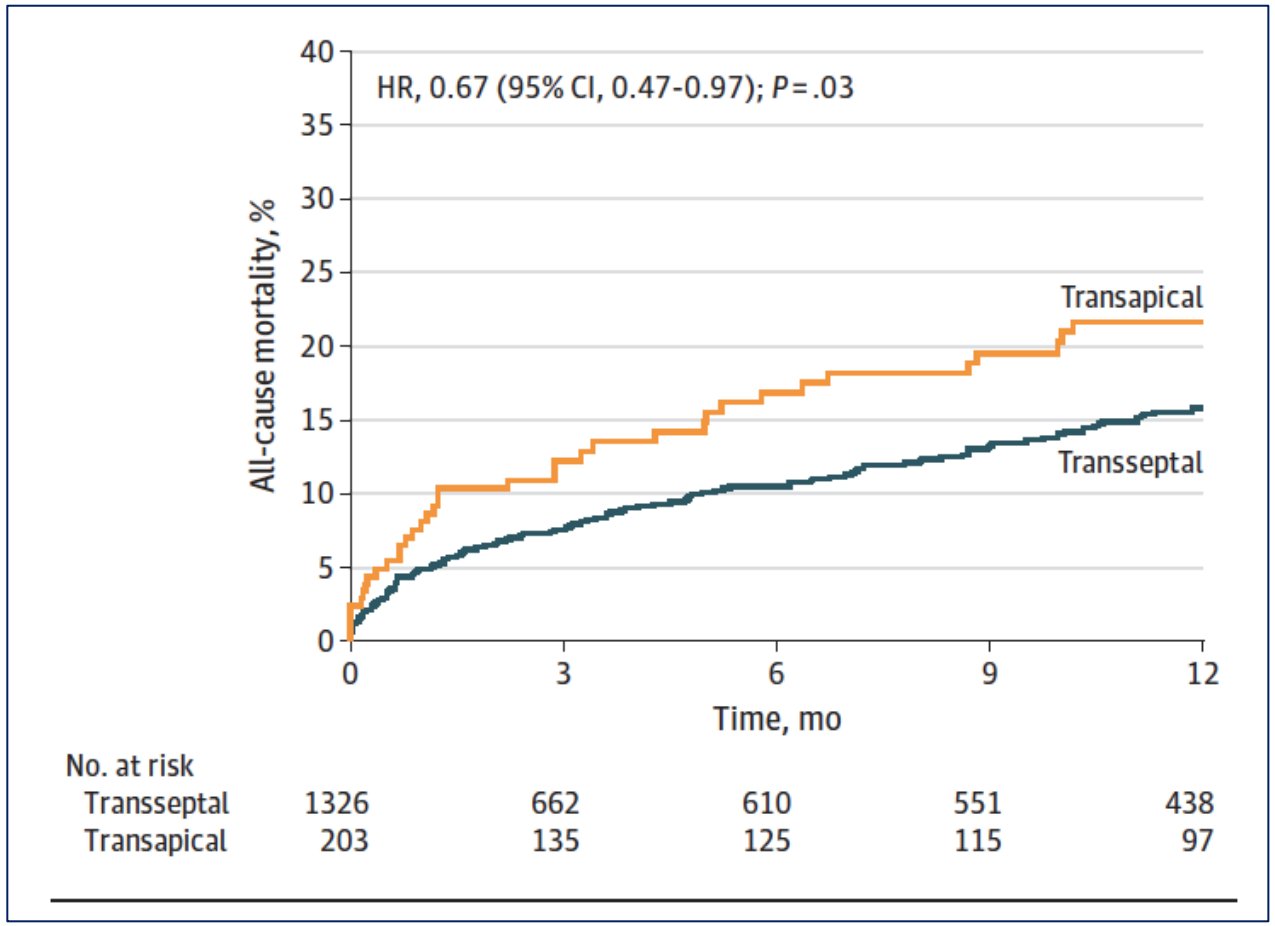


MITRAL
VALVE-IN-VALVE

# PROCEDURAL TECHNIQUE

# Mitral Valve-in-Valve

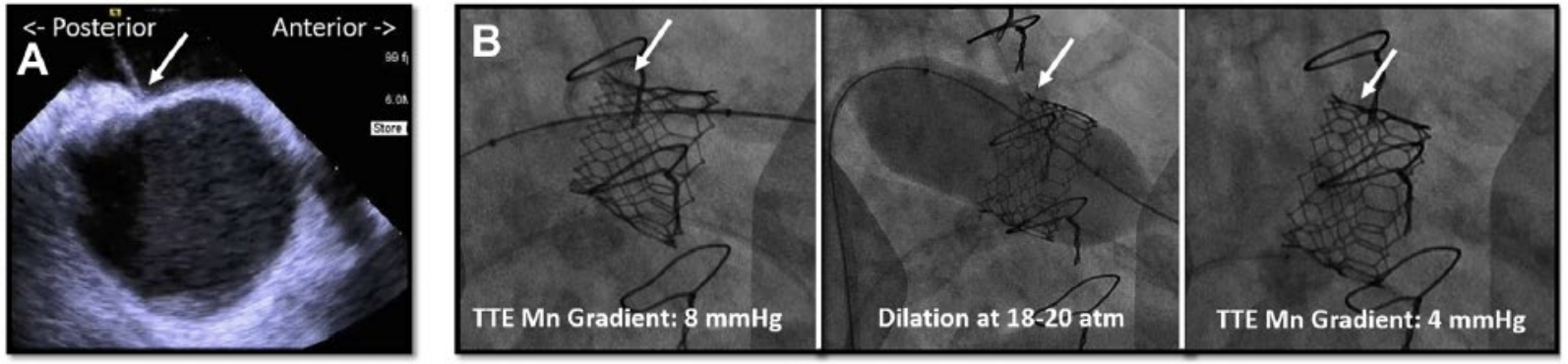
## All-cause mortality. Transapical vs transfemoral




*JAMA Cardiol*. doi:10.1001/jamacardio.2020.2974
Published online July 29, 2020.

# Abordaje minimalista: sedación consciente y ECO-intracardiaco

**FIGURE 1** Minimalist Mitral ViV Replacement Is Feasible and Safe




**C** Select Procedural Details Based on Surgical Valve Type

| Surgical Valve | St Jude Biocor (n=19, 33.9%) | Medtronic Mosaic (n=11, 19.6%) | Carpentier Edwards (n=26, 46.4%) |
|---|---|---|---|
| High-pressure post-dilation | 15 (78.9%) | 6 (54.5%) | 11 (42.3%) |
| No post-dilation (narrow LVOT) | 3 (15.8%) | 3 (27.3%) | 7 (26.9%) |
| Post-TMVR mean gradient | 5.8 ± 2.2 mmHg | 5 ± 1.3 mmHg | 5.2 ± 2.1 mmHg |
| Paravalvular Leak | 0 | 0 | 0 |
| LAMPOON | 0 | 0 | 2 (7.6%) |

**D**

| | Overall (n = 56) | General Anesthesia (n = 14) | Conscious Sedation (n = 42) |
|---|---|---|---|
| **30-day Outcomes** | | | |
| Stroke | 1 (1.8%) | 0 | 1 (2.3%) |
| Mortality | 0 | 0 | 0 |
| New Pacemaker | 1 (1.8%) | 0 | 1 (2.3%) |
| HF Readmission | 2 (3.6%) | 0 | 2 (4.7%) |
| Hospital LoS | --- | 6 ± 6.2 days | 3 ± 3.4 days |
| **Longer-term Outcomes** | | | |
| Mean follow-up | --- | 798 ± 736 days | 263 ± 210 days |
| Mortality | 3 (5.4%) | 2 (14.2%) | 1 (2.3%) |
| HF Readmission | 10 (17.9%) | 4 (28.5%) | 6 (14.2%) |
| Endocarditis | 1 (1.8%) | 0 | 1 (2.3%) |

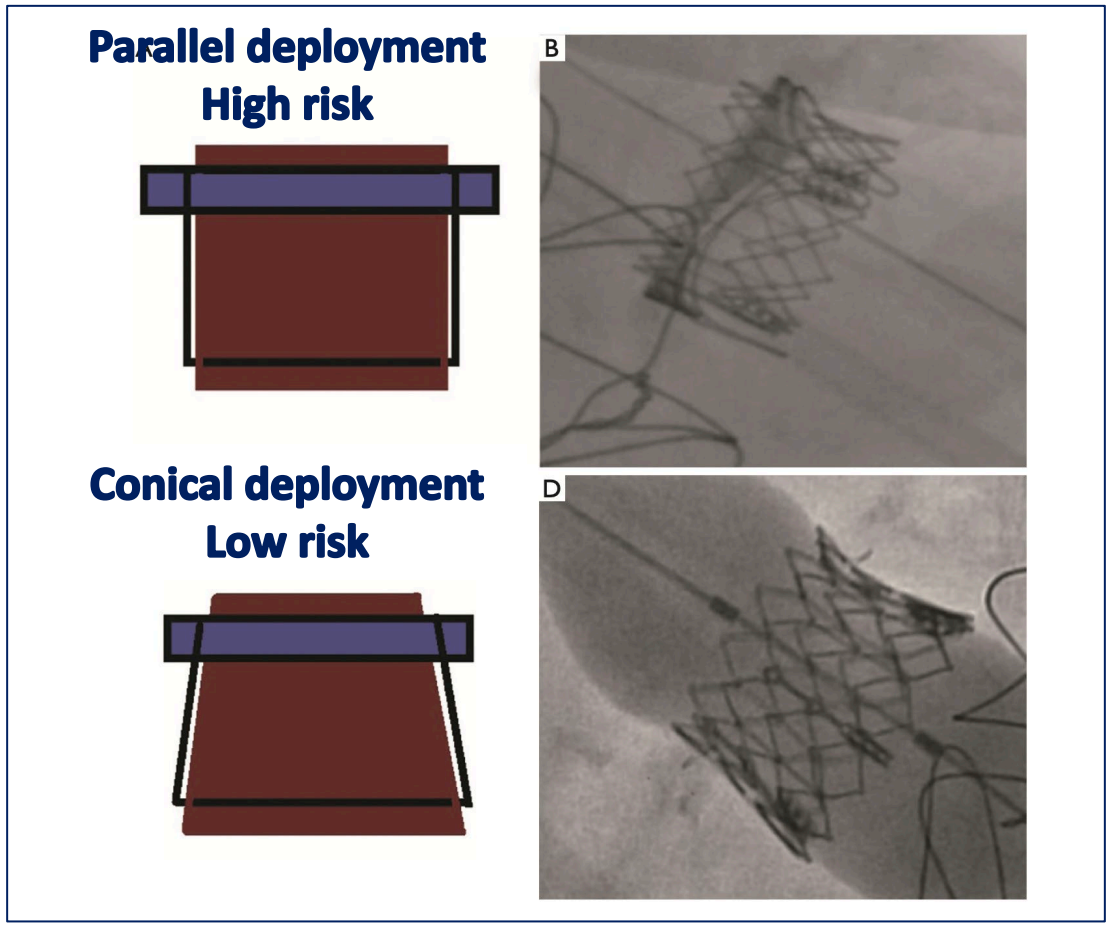
Kapadia S, et al. J Am Coll Cardiol Intv 2022,15:1283-1295-

Edwards Sapien 3

Pacing

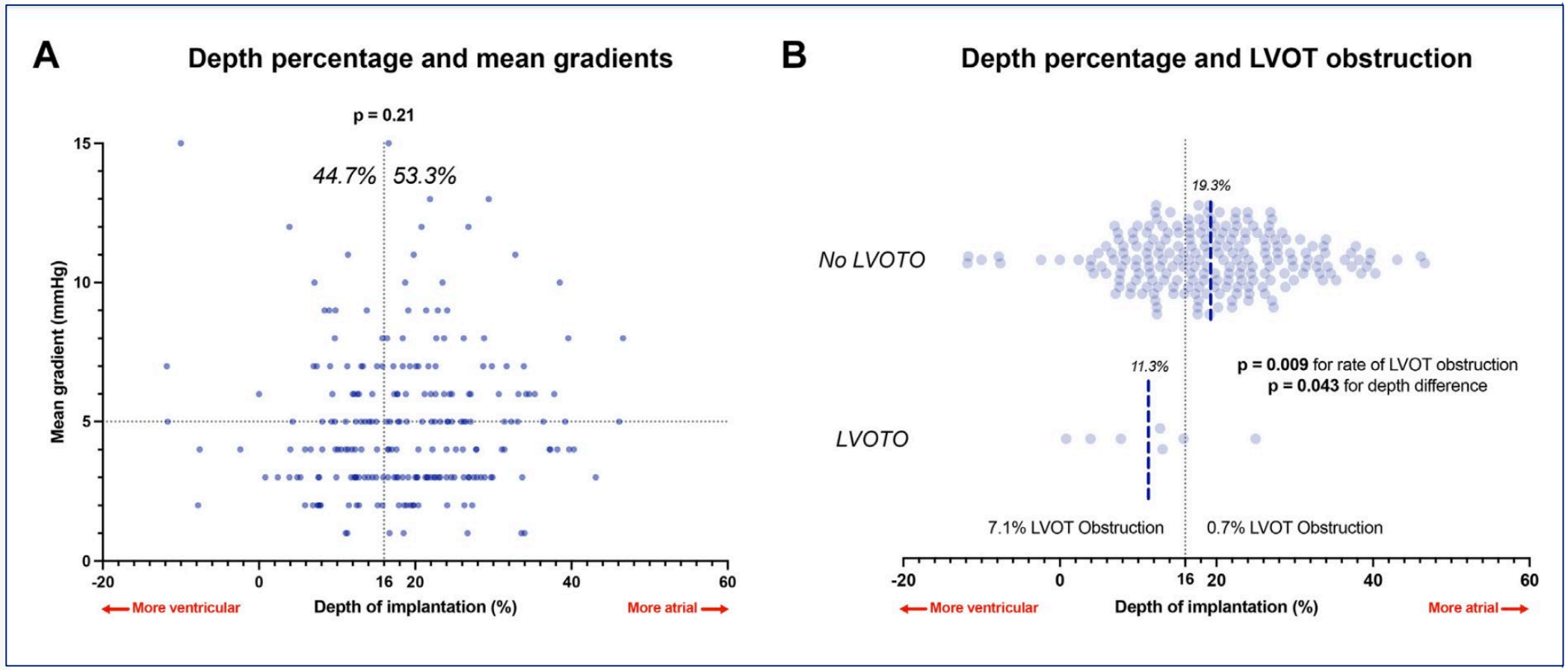
INC CathLab

# Risk of THV embolization




Pirelli et al. Ann Cardiothorac Surg 2021;10:96-112.

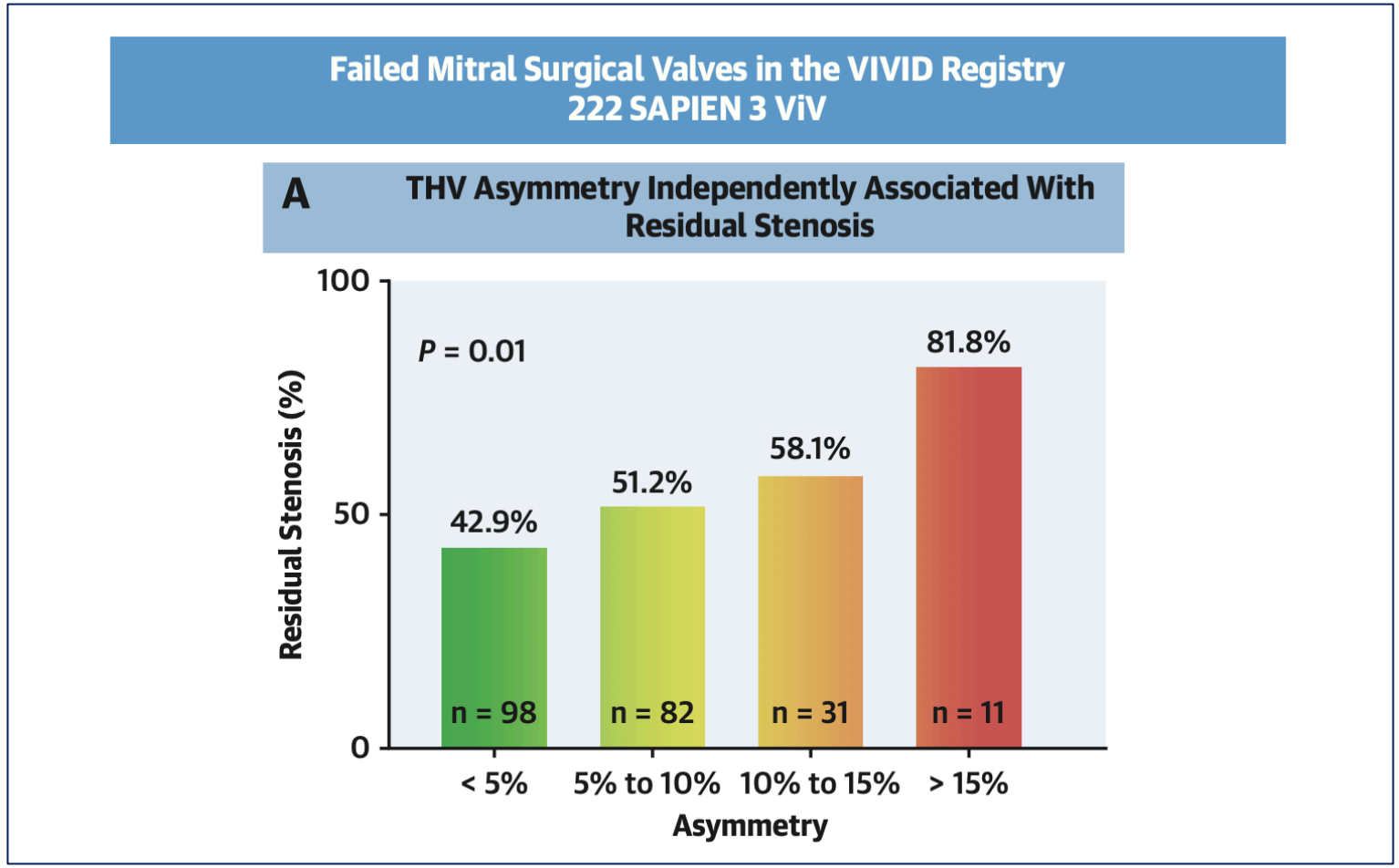
# Depth Percentage Implantation Mean Gradient and LVOT Obstruction




Simonato M, et al. J Am Coll Cardiol Inv 2023;16:2615-2627.

# VIVID REGISTRY

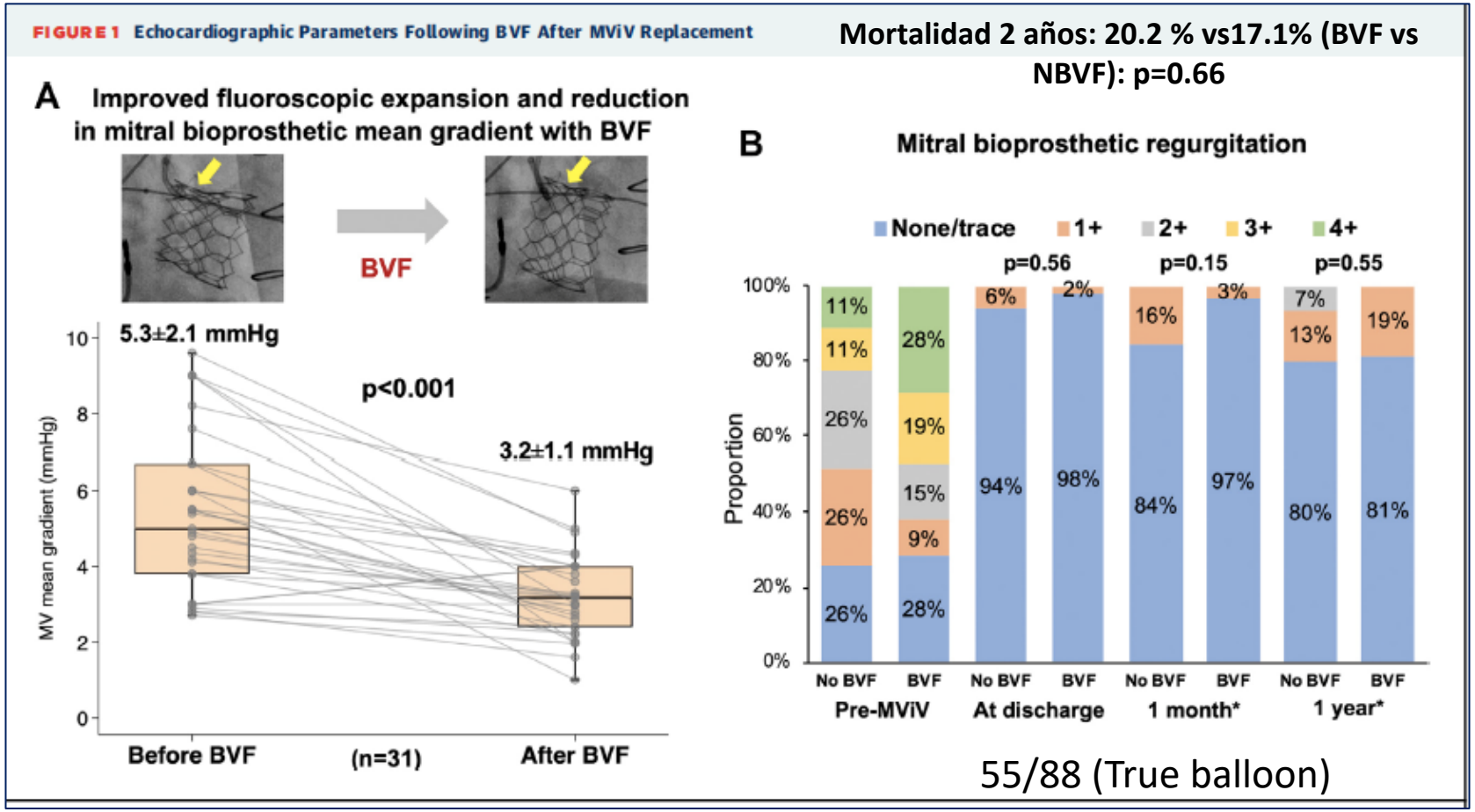
# THV Asymmetry and Residual Stenosis




Simonato M, et al. J Am Coll Cardiol Inv 2023;16:2615-2627.

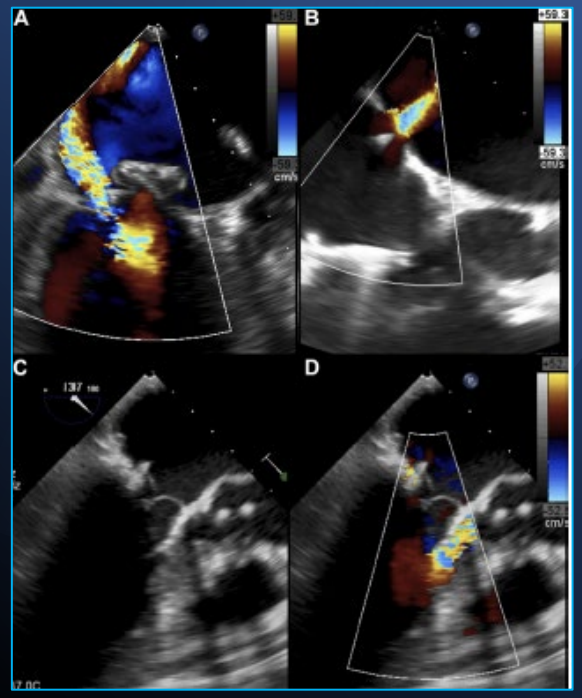
# Bioprosthetic valve fracture in transeptal Mitral Valve-in-Valve replacement

## Stent-frame underexpansion/NeoLVOT/Mean gradient




Kapadia S, et al. J Am Coll Cardiol Intv 2023,16:2942-2944

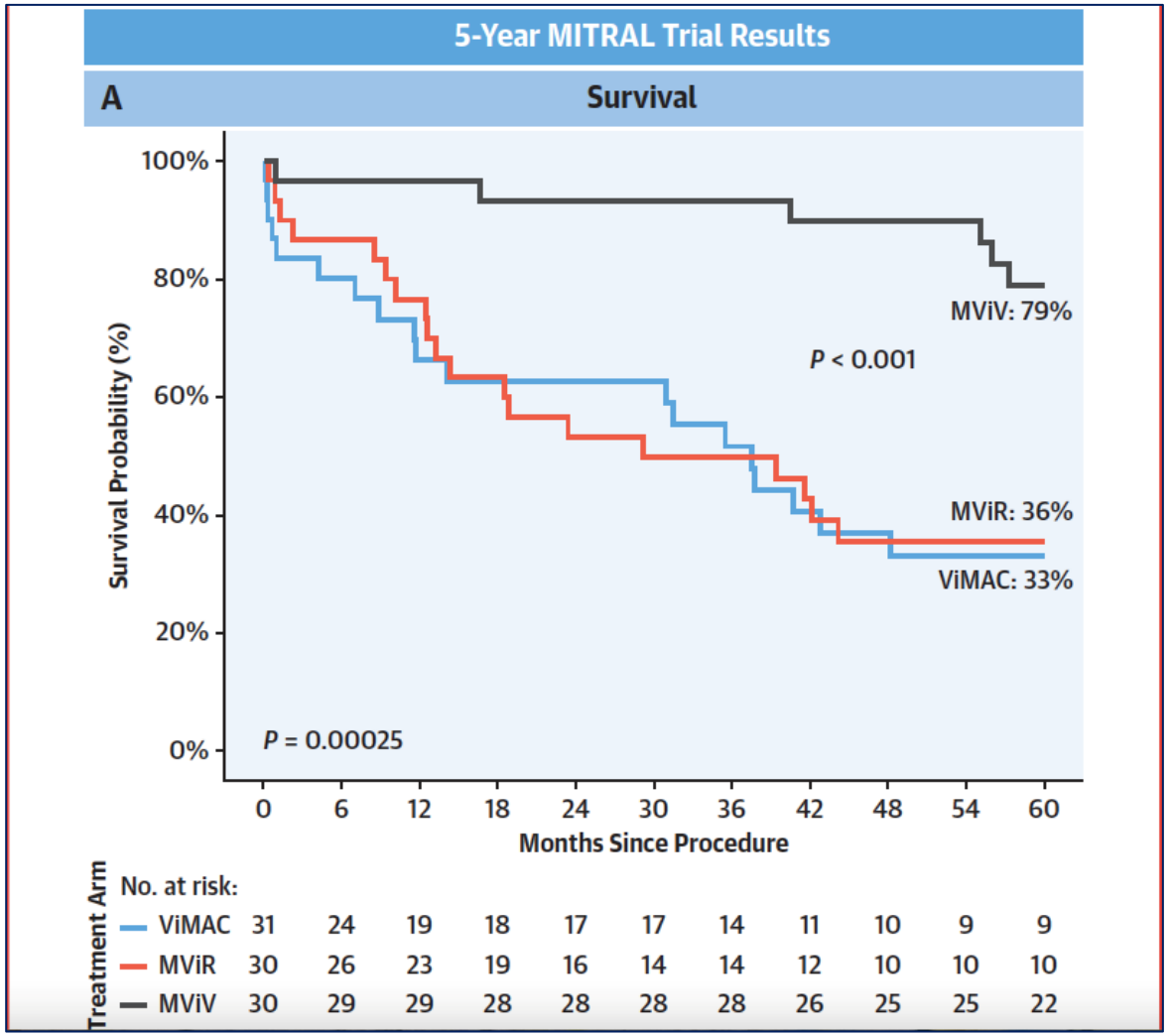
# POST-DEPLOYMENT ASSESSMENT.




- 1. Improper position.
- 2. Paravalvular leak.
- 3. Central MR.
- 4. High transmitral gradients.
- 5. Abnormal motion of the leaflets.
- 6. Right-left interatrial shunt.
- 7. LVOT obstruction.

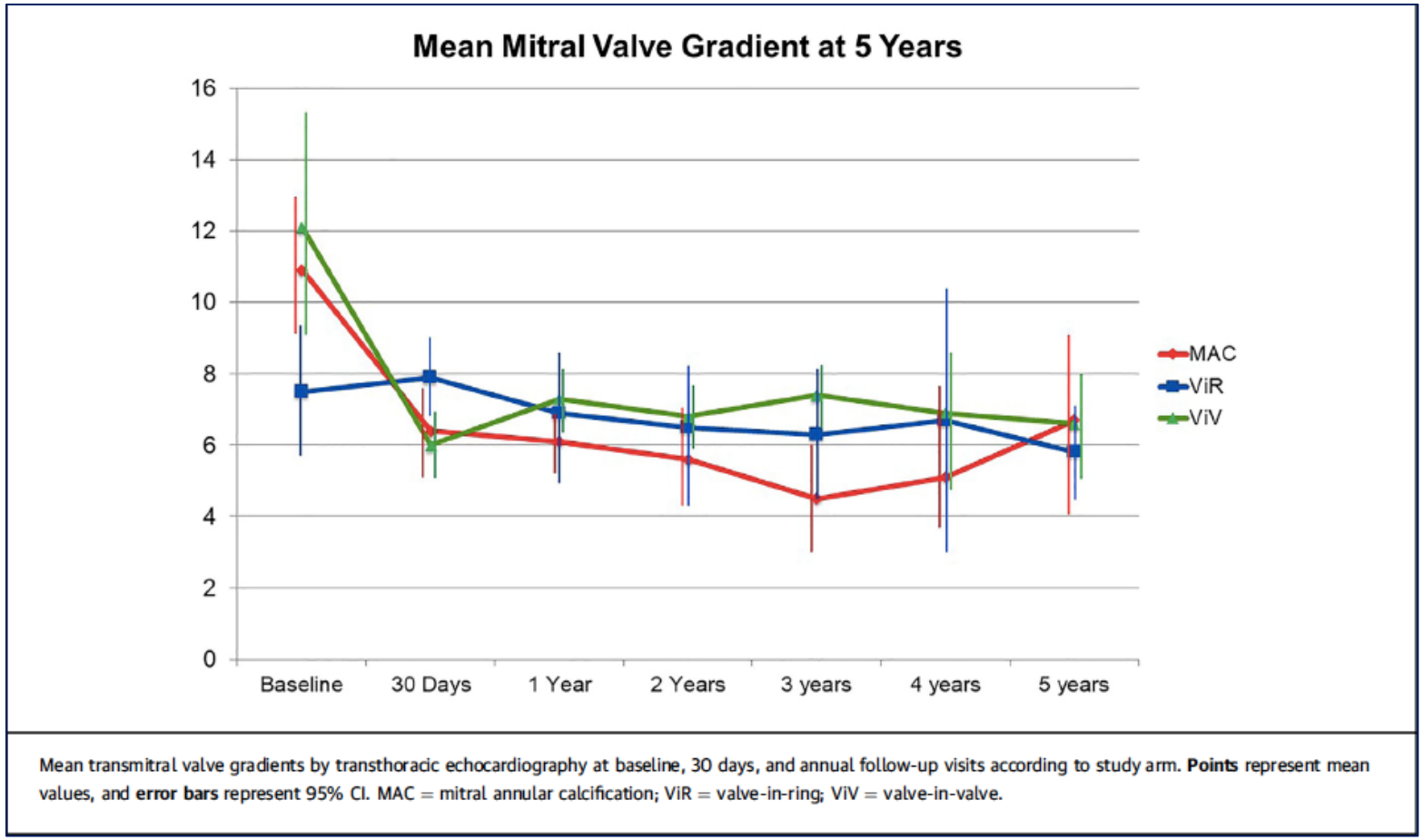
- Severe hypotension: severe MR, tamponade, LVOT-O or major vascular complications.

# Mitral Valve-in-Valve MITRAL Trial




Guerrero M, et al. J Am Coll Cardiol Intv 2023;16:2211-2227.

# Mitral Valve-in-Valve MITRAL Trial

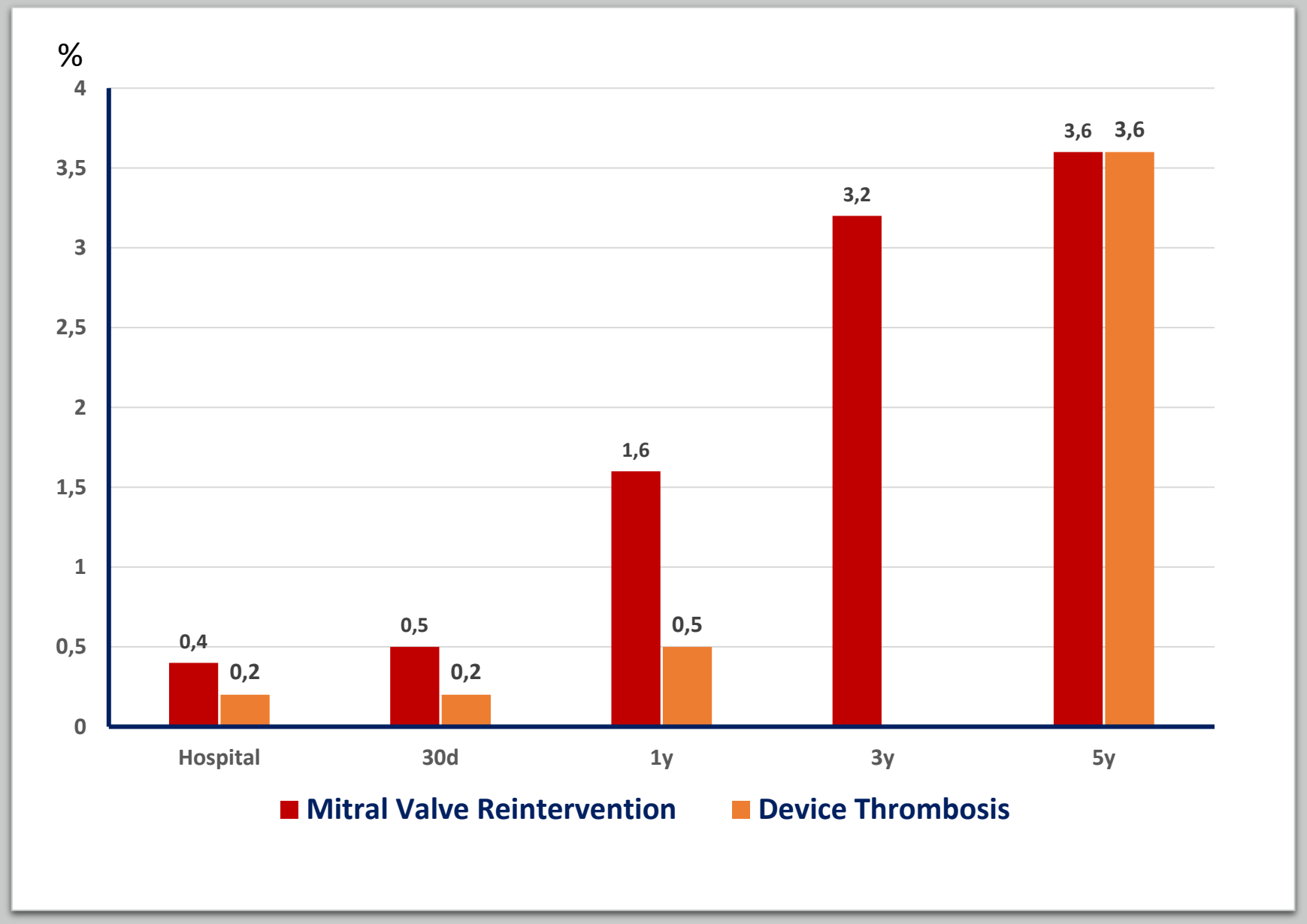



Mean transmitral valve gradients by transthoracic echocardiography at baseline, 30 days, and annual follow-up visits according to study arm. **Points** represent mean values, and **error bars** represent 95% CI. MAC = mitral annular calcification; ViR = valve-in-ring; ViV = valve-in-valve.

Guerrero M, et al. J Am Coll Cardiol Intv 2023;16:2211-2227.

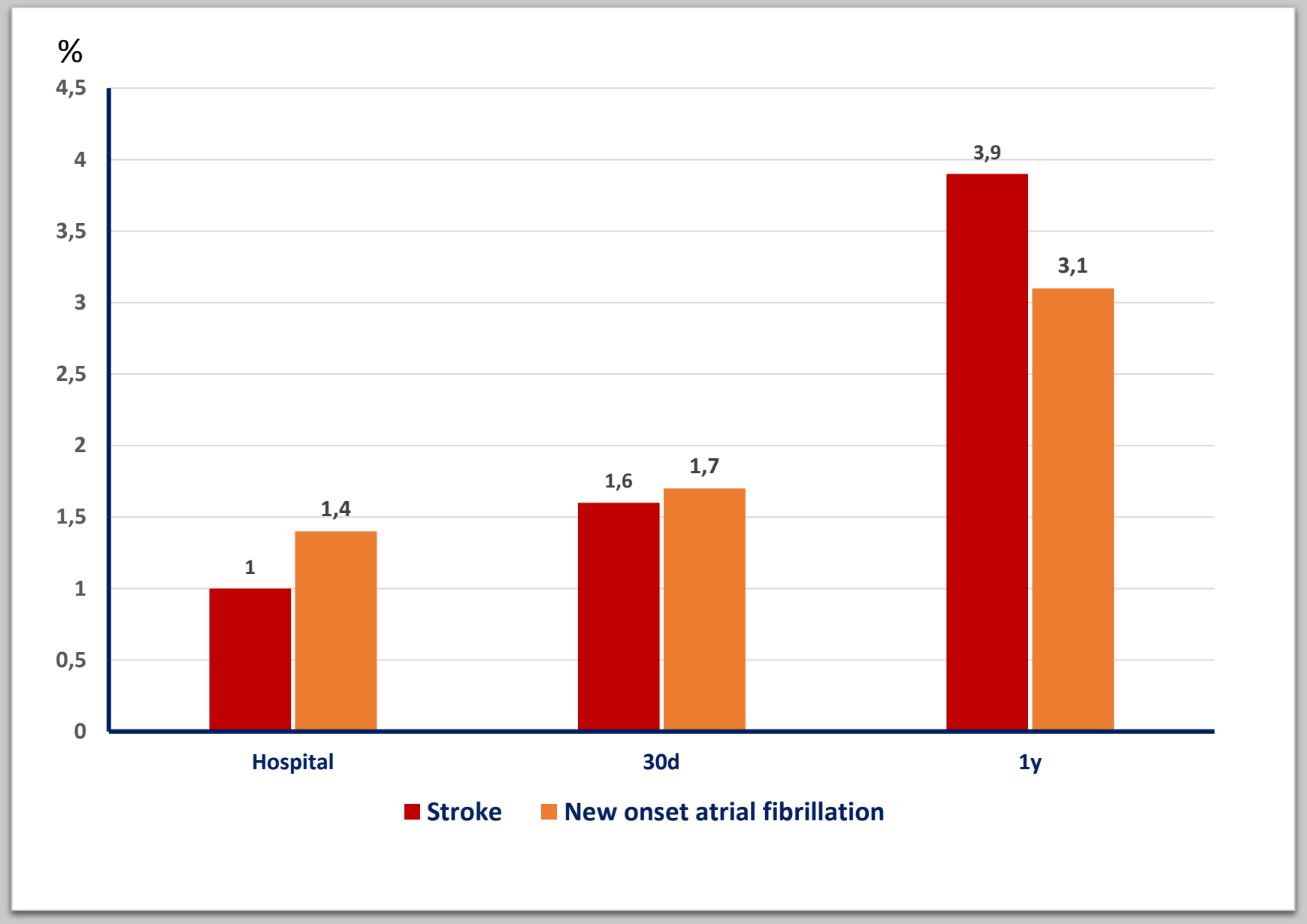
## Mitral Valve Reintervention Device Thrombosis

## Mitral Valve-in-Valve MITRAL Trial TVT Registry




E-y outcomes. Eleid MF, et al. JACC Cardiovasc Interv 2025;18:1454-1466. 5-y clinical outcomes. Guerrero M, et al. J Am Coll Cardiol Intv 2023;16:2211-2227.

# Mitral Valve-in-Valve Stroke and New Onset Atrial Fibrillation TVT Registry

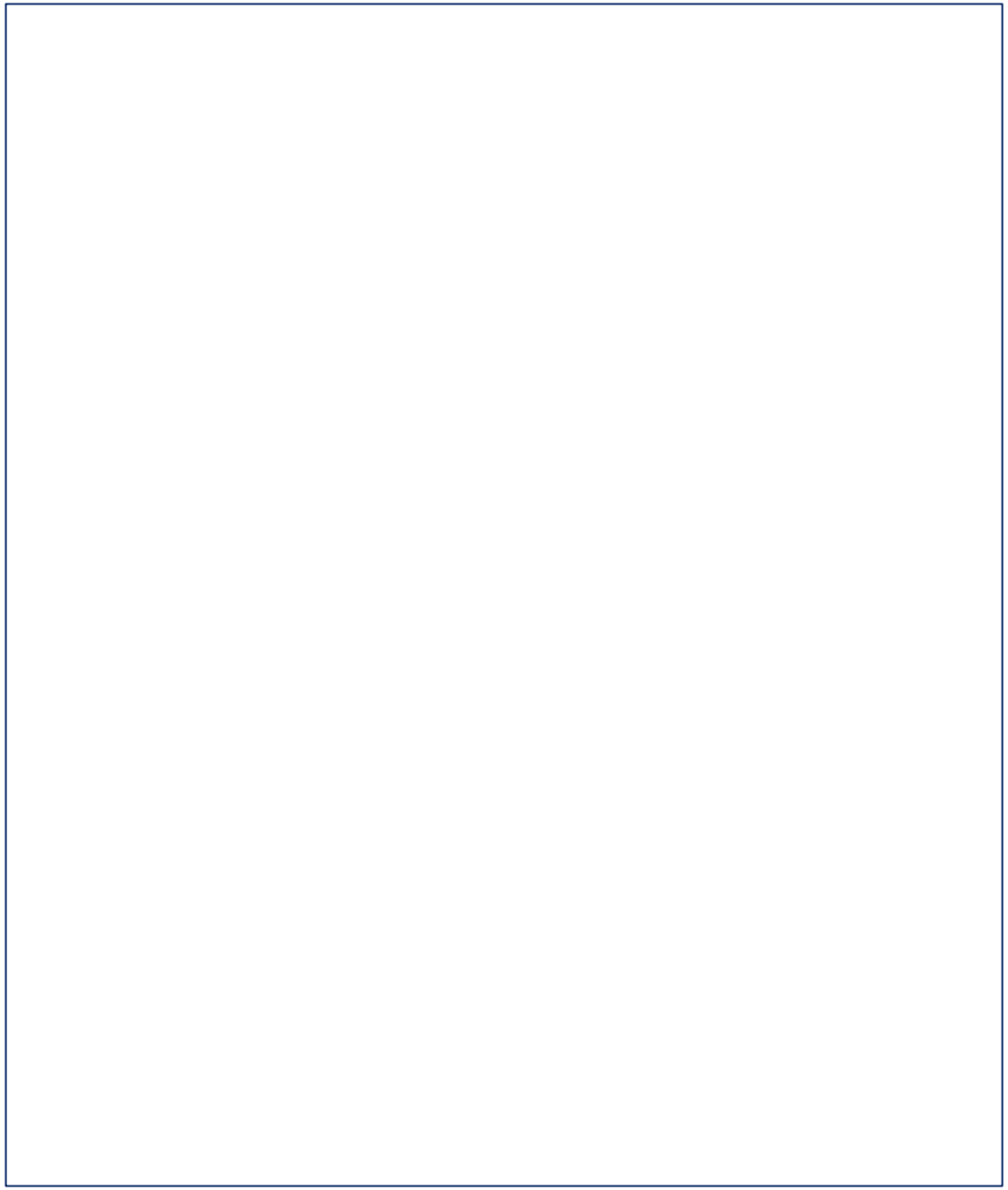



Eleid MF, et al. JACC Cardiovasc Interv 2025;18:1454-1466.

# Mitral Valve-in-Valve

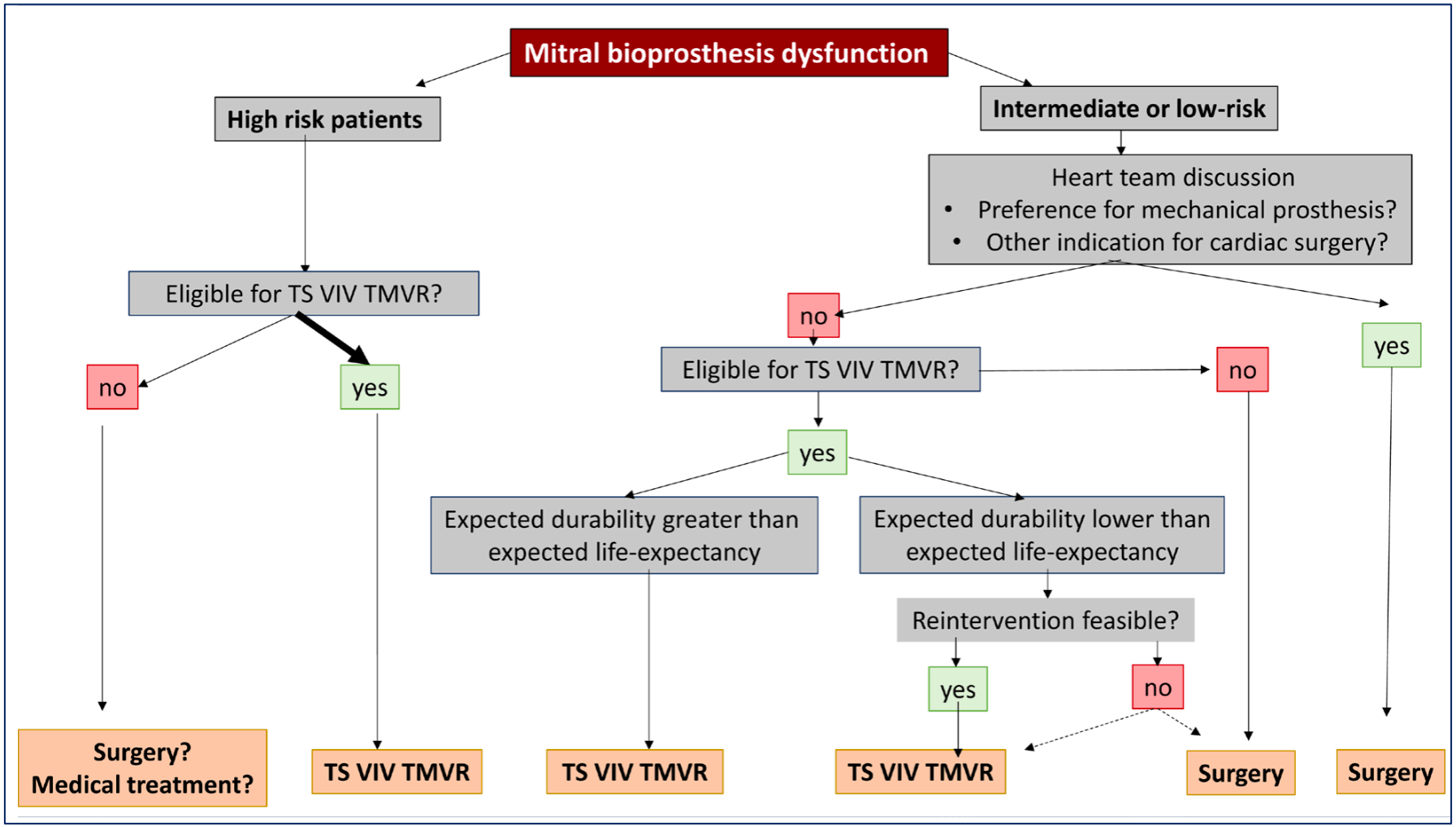
## Associated outcome of TR

TVT REGISTRY



# POTENTIAL INDICATIONS OF TRANSSEPTAL MITRAL VALVE-IN-VALVE

Marina Urena. Circulation 2024;150:1505-1507.



# Mitral Valve-in-Valve

## CONCLUSIONS

1. Accurate screening process.
2. Procedural technique: conical deployment, implantation should not be more than 20% at the atrial level. To reduce postdeployment THV asymmetry.
3. High STS Risk score and nonselective procedure status are associated with higher mortality.
4. MViV is associated with favorable mid-term outcomes-Reintervention rates of 3.6% at 5y.
5. Formal long-term oral anticoagulation.

# SOLACI SOCIME'25

MEXICO CITY

## AUGUST 6 - 8, 2025

EXPO SANTA FE, MEXICO

XXX ANNUAL CONGRESS OF LATIN AMERICAN SOCIETY OF INTERVENTIONAL CARDIOLOGY

ANNUAL CONGRESS OF THE MEXICAN SOCIETY OF INTERVENTIONAL CARDIOLOGY

SOLACI 30 ANIVERSARIO
SOCIEDAD LATINOAMERICANA DE CARDIOLOGIA INTERVENCIONISTA

SOCIME
SOCIEDAD DE CARDIOLOGIA INTERVENCIONISTA DE MEXICO

www.solacicongress.org