

# Timing And typology of ConducTlon disturbanCes during TAVR the TACTIC-TAVR registry

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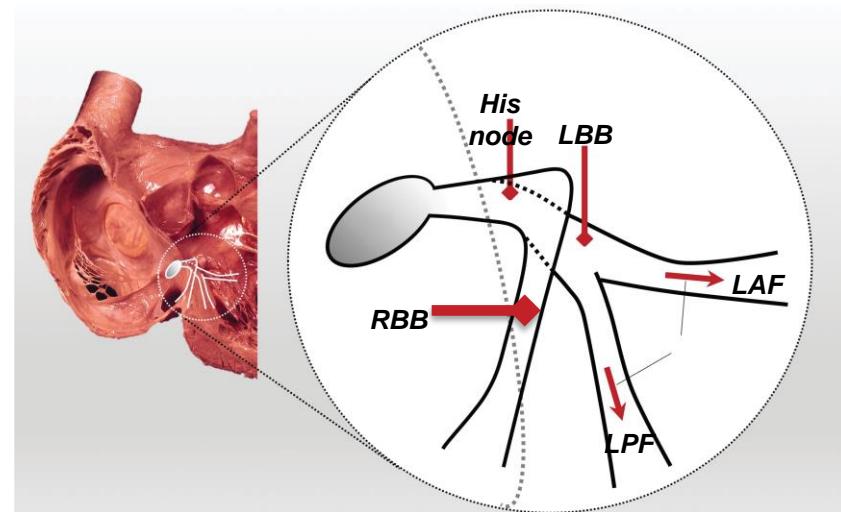


# Disclosure of Relevant Financial Relationships

I, Matteo Maurina DO NOT have any financial relationships to disclose.

# Background - Conduction Disturbances during TAVR

- Despite the decline in complications, TAVR-related conduction disturbances are frequent and may lead to PM implantation.
- Predictors of PM implantation include baseline RBBB, short membranous septum, self-expanding valves, low implantation depth and valve oversizing.



1. Tung et al. Defining LBBB Patterns in Cardiac Resynchronisation Therapy: A Return to His Bundle Recordings. Arrhythm Electrophysiol Rev 2022

## Background – Impact of PM after TAVR

- Although considered safe, PM carries risk of infection, lead failure, tricuspid rigurgitation and necessitates long-life follow-up.
- Despite improvement in TAVR technology and techniques, global rate of PM after TAVR still remains >10%.

**Current guidelines provide limited indications  
on how to stratify PM risk after TAVR based on  
intraprocedural conduction disturbances.**

# TACTIC-TAVR registry - Design and objectives

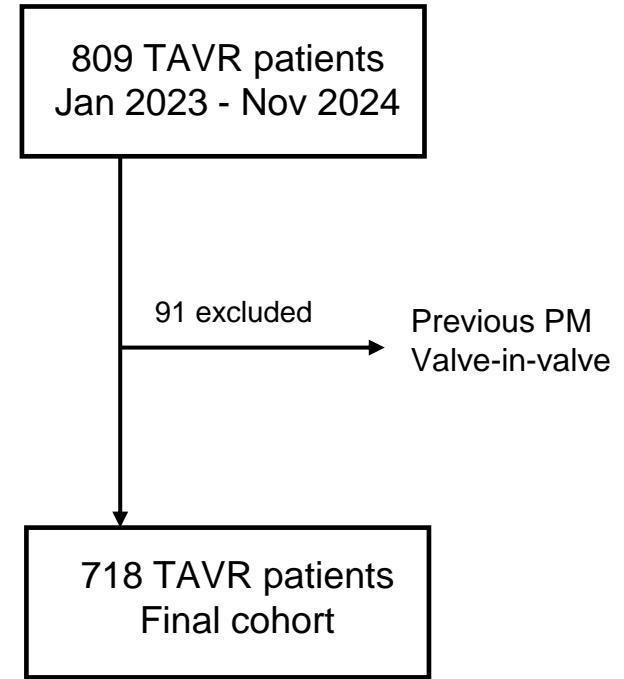
International, multicentric, obs. prospective registry.

Six high-volume TAVR centers.

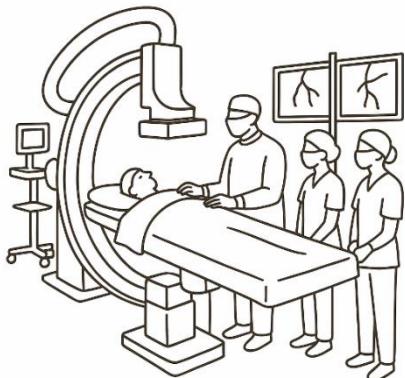


1. Humanitas Research Hospital (Rozzano, Italy)
2. ASST Niguarda Hospital (Milano, Italy)
3. IRCC Monzino Hospital (Milano, Italy)
4. Essex Cardiothoracic Center (London, UK)
5. Hospital Universitari la Fe (Valencia, Spain)
6. Montefiore Medical Center (New York, USA)

Aim: assess prevalence, timing, degree of procedural CDs and impact on PM need after TAVR.



# TACTIC-TAVR registry – Methods and endpoints



Standard TAVR procedure  
with BEVs or SEVs  
according to local practice.

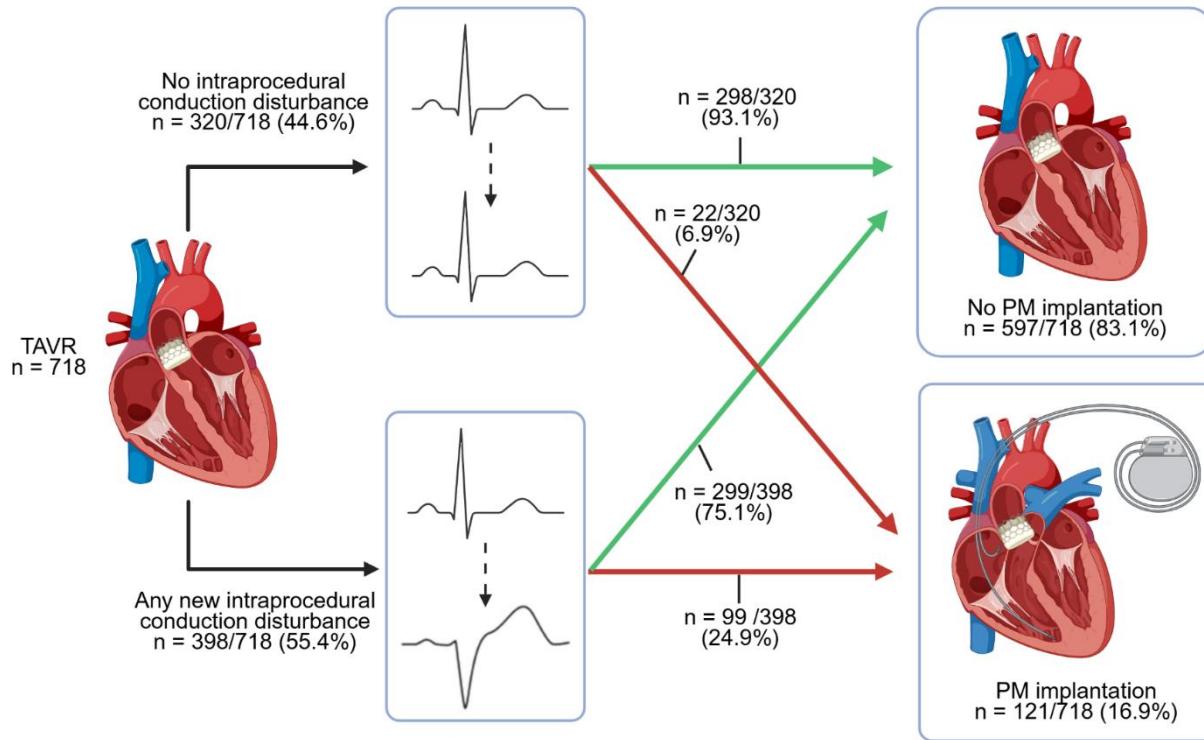
Continuous intraprocedural  
ECG monitoring recorded in  
cath-lab polygraph.

Intraprocedural conduction  
disturbances classification.

## Endpoints

- 1) Occurrence of any new intraprocedural conduction disturbance.
- 2) Occurrence of 30-day PM implantation after TAVR

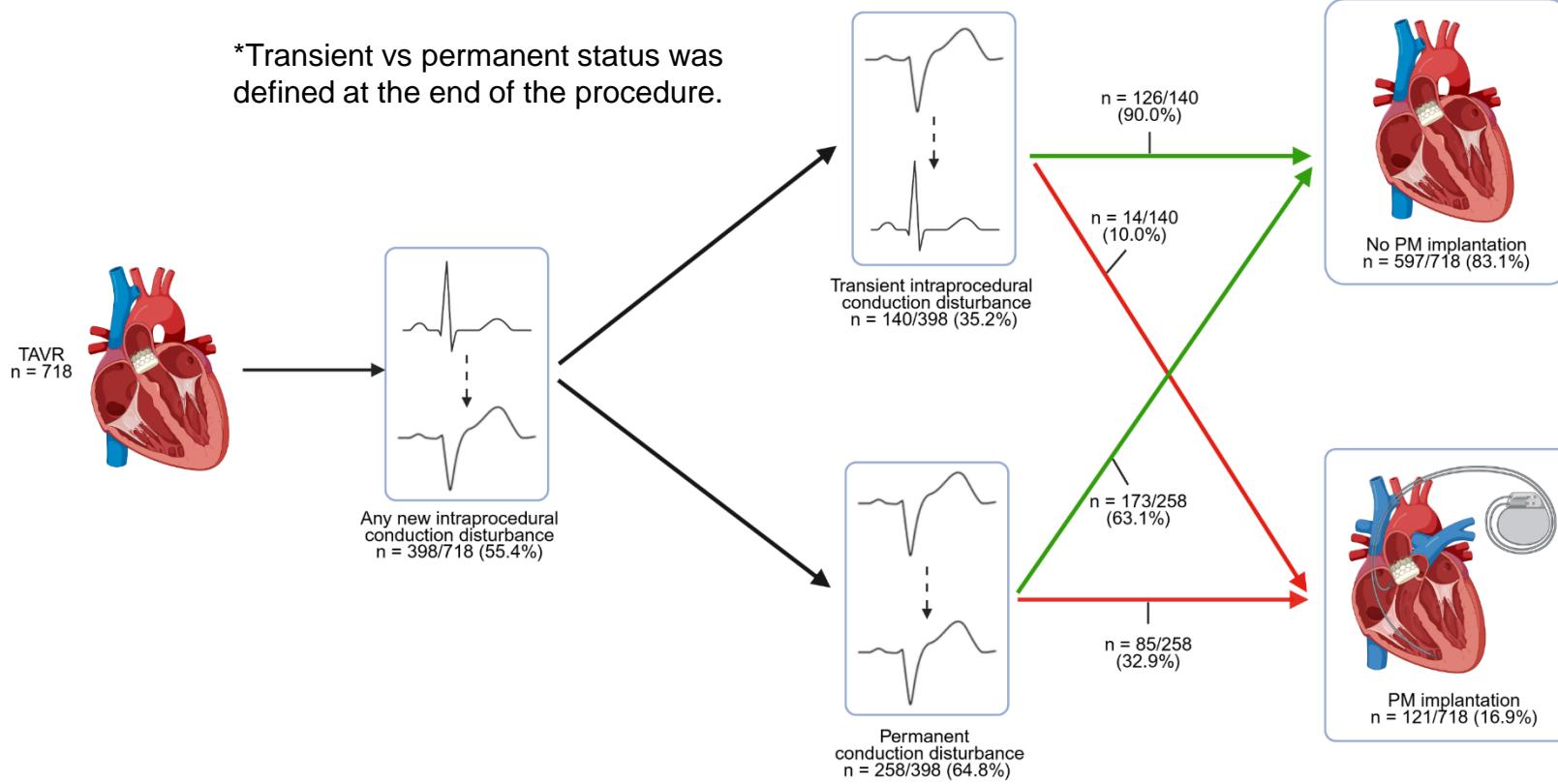
# Results - Conduction disturbances and PM implantation



\*Median time to PM was 2.6 days after TAVR

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\*Transient vs permanent status was defined at the end of the procedure.



# Intraprocedural CDs – Uni and multivariate analysis

|                                  | Univariate |            |         | Multivariate* |             |         |
|----------------------------------|------------|------------|---------|---------------|-------------|---------|
|                                  | OR         | 95% CI     | p-value | OR            | 95% CI      | p-value |
| Age, years                       | 1.00       | 0.98-1.02  | 0.90    |               |             |         |
| Female sex                       | 1.26       | 0.93-1.69  | 0.12    |               |             |         |
| LVEF, %                          | 1.00       | 0.99-1.02  | 0.43    |               |             |         |
| Annulus mean diameter, mm        | 0.99       | 0.97-1.02  | 0.76    |               |             |         |
| Annulus area, mm <sup>2</sup>    | 0.99       | 0.99-1.00  | 0.11    |               |             |         |
| Annulus perimeter, mm            |            |            |         | 0.7-1.02      |             | 0.65    |
| LVOT mean diameter, mm           |            |            |         |               |             |         |
| <u>LVOT area, mm<sup>2</sup></u> |            |            |         | 0.9-1.00      |             | 0.03    |
| Membranous septum length, mm     | 0.85       | 0.77-0.95  | <0.01   | 0.88          | 0.78-1.00   | 0.05    |
| Femoral access                   | 7.71       | 1.71-34.72 | <0.01   |               | 1 (omitted) |         |
| Balloon expandable valve         | 0.79       | 0.56-1.11  | 0.18    |               |             |         |
| Postdilatation                   | 1.37       | 0.98-1.92  | 0.07    | 1.29          | 0.68-2.44   | 0.44    |
| Pacing on LV wire                | 1.51       | 1.11-2.04  | <0.01   | 0.65          | 0.35-1.17   | 0.15    |
| Sinus rhythm                     | 0.56       | 0.37-0.83  | <0.01   |               | 1 (omitted) |         |
| PR length, ms                    | 1.01       | 1.00-1.01  | 0.04    | 1.00          | 0.99-1.01   | 0.25    |

Smaller LVOT and shorter membranous septum were independent predictors of intraprocedural CDs

## Pts with and without PPI – Clinical characteristics

|                       | New permanent PM<br>n = 121 | No new permanent PM<br>n = 597 | p-value |
|-----------------------|-----------------------------|--------------------------------|---------|
| Age, years            | 81 (77-85)                  | 81 (77-85)                     | 0.82    |
| Female, sex           | 61 (50.4)                   | 312 (52.3)                     | 0.76    |
| Arterial hypertension | 101 (83.5)                  | 509 (85.3)                     | 0.58    |
| Diabetes              | 36 (29.8)                   | 169 (28.3)                     | 0.74    |
| eGFR < 60 ml/min      | 54 (44.6)                   | 244 (40.9)                     | 0.48    |
| LVEF, %               | 60 (55-65)                  | 60 (55-65)                     | 0.36    |
| History of AF         | 31 (25.6)                   | 171 (28.6)                     | 0.58    |
| History of CAD        | 32 (26.4)                   | 189 (31.7)                     | 0.28    |
| Previous PCI          | 20 (16.5)                   | 132 (22.1)                     | 0.18    |

## Pts with and without PPI - Anatomical characteristics

|                               | New permanent PM<br>n = 121 | No new permanent PM<br>n = 597 | p-value |
|-------------------------------|-----------------------------|--------------------------------|---------|
| Annulus mean diameter, mm     | 23.9 (22.1-25.2)            | 24 (22.4-25.7)                 | 0.44    |
| Annulus area, mm <sup>2</sup> | 441.4 (385.1-488.7)         | 434.3 (380.1-495.8)            | 0.97    |
| Annulus perimeter, mm         | 75.8 (70.9-79.9)            | 75.1 (70.3-80.4)               | 0.94    |
| LVOT mean diameter, mm        | 23.2 (21.3-25.5)            | 23.7 (21.9-25.4)               | 0.34    |
| LVOT area, mm <sup>2</sup>    | 414.9 (352.2-490)           | 420.3 (360.5-487.5)            | 0.44    |
| Membranous septum length, mm  | 4.8 (3.3-6.0)               | 5.2 (3.8-6.5)                  | 0.31    |
| Bicuspid valve                | 6 (5.4)                     | 30 (5.4)                       | 1.00    |
| Calcification in LVOT         | 31 (28.2)                   | 121 (22.1)                     | 0.17    |

# Pts with and without PPI - Procedural and ECG characteristics

|                          | <b>New permanent PM<br/>n = 121</b> | <b>No new permanent PM<br/>n = 597</b> | <b>p-value</b> |
|--------------------------|-------------------------------------|----------------------------------------|----------------|
| Balloon expandable valve | 27/116 (23.4)                       | 148/574 (25.8)                         | 0.64           |
| Predilatation            | 70 (57.8)                           | 377 (63.1)                             | 0.30           |
| Implantation height, mm  | 4.5 (3-6)                           | 4.0 (3-5)                              | 0.06           |
| <u>Pacing on LV wire</u> | 34 (28.1)                           | 254 (42.6)                             | <0.01          |
| <u>QRS length, ms</u>    | 100 (90-135)                        | 96 (90-108)                            | <0.001         |
| PR length, ms            | 175 (164-201)                       | 494 (160-198)                          | 0.24           |
| <u>QRS morphology</u>    |                                     |                                        | <0.001         |
| Normal                   | 55 (45.4)                           | 382 (64.0)                             |                |
| LBBB                     | 4 (3.3)                             | 45 (7.5)                               |                |
| RBBB                     | 29 (24.0)                           | 24 (4.0)                               |                |
| Emiblock                 | 15 (12.4)                           | 111 (18.6)                             |                |
| Bifascicular block       | 14 (11.6)                           | 10 (1.7)                               |                |
| Intraventricular delay   | 4 (3.3)                             | 25 (4.2)                               |                |

# Pts with and without PPI – Intraprocedural conduction disturbances

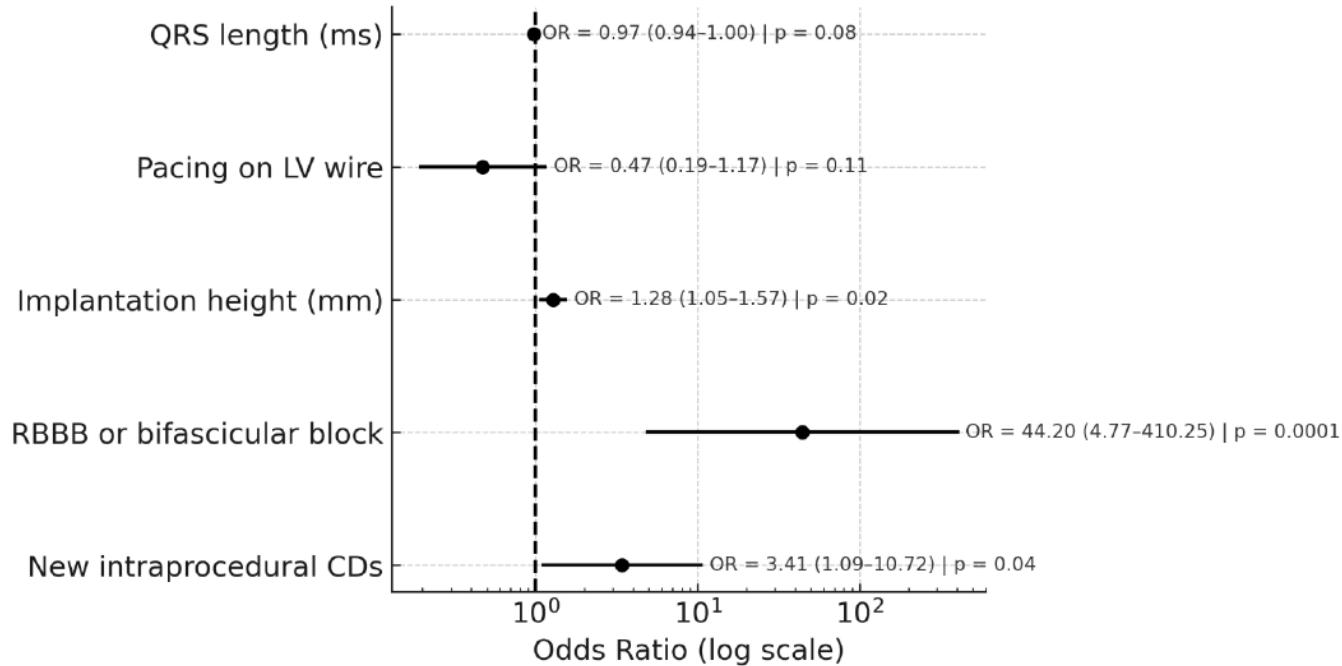
|                                                                                                      | New permanent PM<br>n = 121 | No new permanent PM<br>n = 597 | p-value |
|------------------------------------------------------------------------------------------------------|-----------------------------|--------------------------------|---------|
| New intraprocedural disturbance conduction onset                                                     | 99 (81.8)                   | 299 (50.1)                     | <0.001  |
| New intraprocedural conduction disturbance onset (excluding complete AVB, high AVB, asystole and JR) | 34/56 (60.7)                | 259/557 (46.5)                 | 0.05    |

# Pacemaker implantation – Uni and multivariate analysis

|                                                                                  | Univariate |            |         | Multivariate* |             |         |
|----------------------------------------------------------------------------------|------------|------------|---------|---------------|-------------|---------|
|                                                                                  | OR         | 95% CI     | p-value | OR            | 95% CI      | p-value |
| Age, years                                                                       | 1.00       | 0.97-1.03  | 0.83    |               |             |         |
| Female sex                                                                       | 0.93       | 0.63-1.37  | 0.71    |               |             |         |
| LVEF, %                                                                          | 1.01       | 0.99-1.03  | 0.21    |               |             |         |
| Annulus perimeter, mm                                                            | 1.00       | 0.98-1.02  | 0.87    |               |             |         |
| LVOT area, mm <sup>2</sup>                                                       |            |            |         |               |             |         |
| Membraneous septum, mm                                                           |            |            |         |               |             |         |
| QRS length, ms                                                                   |            |            |         |               |             | 0.08    |
| Pacing on L                                                                      |            |            |         |               |             | 0.11    |
| Implantation site, %                                                             | ....       | ....       | ....    | ....          | ....        | 0.02    |
| Balloon expandable valve                                                         | 0.87       | 0.55-1.40  | 0.57    |               |             |         |
| RBBB or bifascicular block                                                       | 9.13       | 5.49-15.18 | <0.001  | 44.2          | 4.77-410.25 | <0.001  |
| Intraprocedural conduction disturbance (excluding complete AVB, asystole and JR) | 1.78       | 1.01-3.12  | 0.04    | 3.41          | 1.09-10.72  | 0.04    |

Baseline RBBB or bifascicular block, implantation height and new “non severe” intraprocedural conduction disturbances were independent predictors of 30-day PM implantation

# Pacemaker implantation – predictors



# TACTIC TAVR registry – main findings

The **main findings** of the study are:

- More than half of TAVR patients had intraprocedural CDs.
- Nearly 17% required PM, 81.8% of whom had at least one intraprocedural CD.
- Smaller LVOT and shorter MS emerged as independent predictors of CDs.
- Baseline RBBB or bifascicular block, implantation depth and **new «non-severe» CDs** predicted 30-day PM implant after TAVR.

## TACTIC TAVR registry – limits

- Confounding factors due to observational design.
- TAVR procedure was not protocol-mandated and may have introduced centre-level bias.
- Lack of core-lab: ECG monitoring and CT scan analysis left to operators.
- Heterogeneity in PM indications.
- PM outcome limited to 30-day horizon.



# TACTIC TAVR registry – implications

- **Intraprocedural monitoring matters.**
- **Risk stratification should be individualized** based on anatomical, baseline ECG, pre- and intraprocedural features.
- **“Non-severe” conduction disturbances does not mean benign.**