

# LBBB after TAVI. What to do?

# EuroValve

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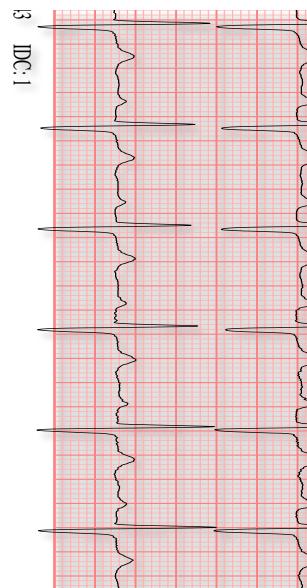
*Eurovalve Liège, Octobre 2021*

## Conflicts of interest:

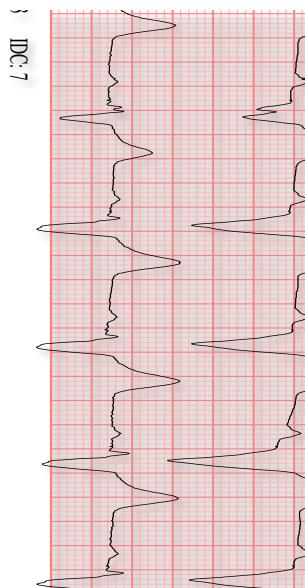
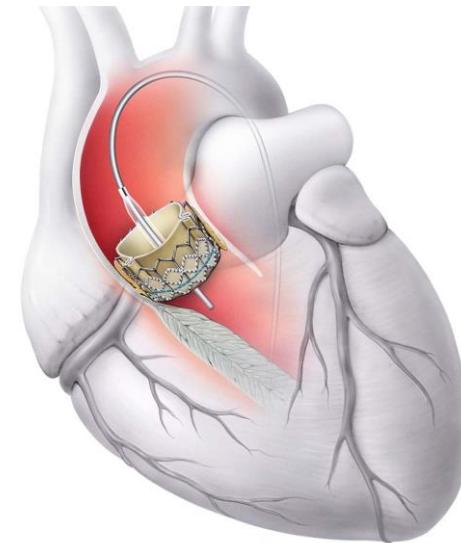
- Proctor for transcatheter valve, Medtronic
- Proctor for LAAO, Abbott
- Speaker fees: Boston Scientific, Terumo

# LBBB after TAVI. Plan

✓ Why ?



✓ What is the risk?



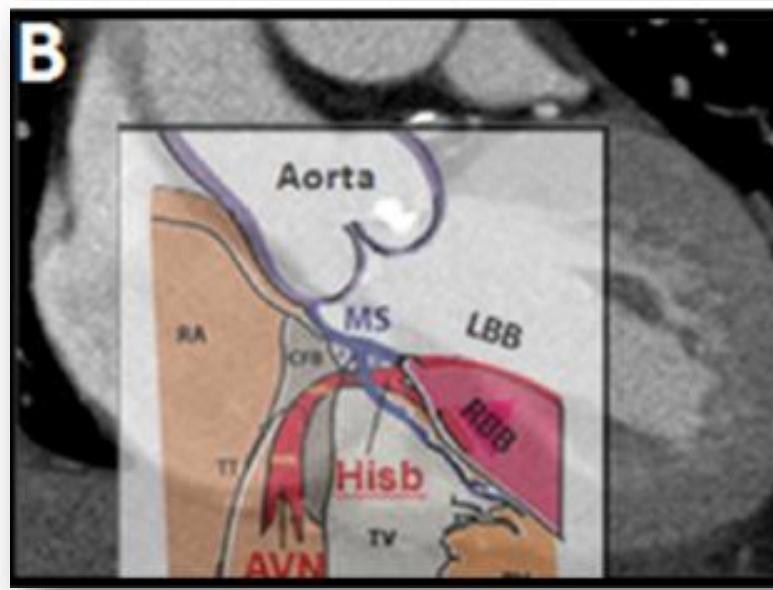
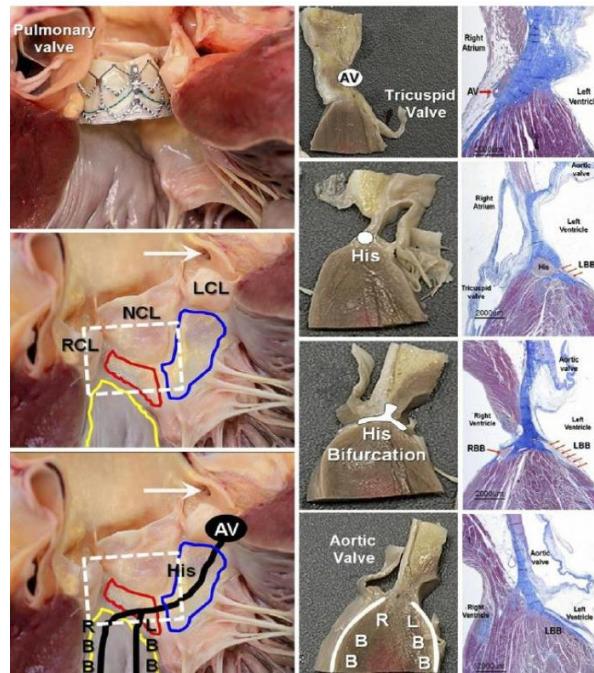
✓ Should we pace?

✓ When and how?

# Causes of LBBB after TAVI

- New-onset LBBB is the most frequent conduction disturbance 10-37%\*
- Close anatomical proximity of the left bundle and the aortic valve

JACC Cardiovasc Interv DOI:10.1016/j.jcin.2012.03.004



Hamdam A et al, JACC Intv 2015;8:1218-28

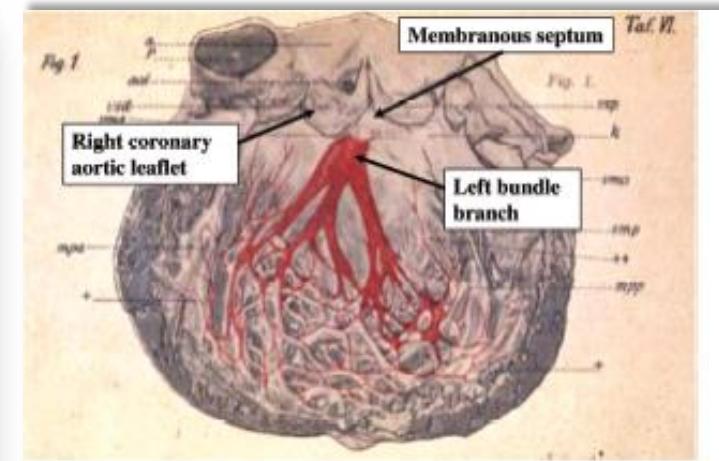
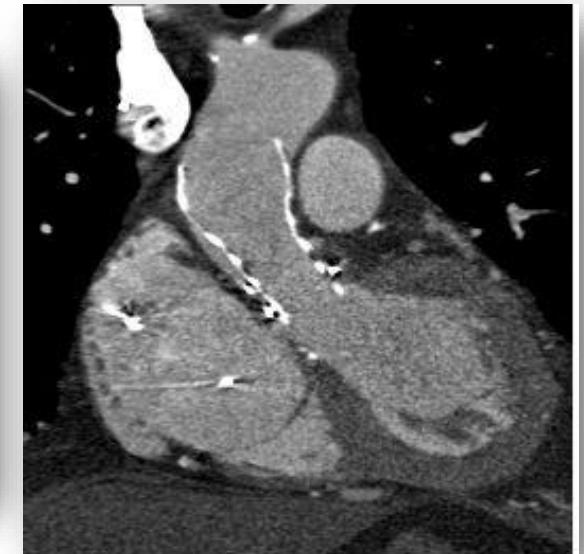
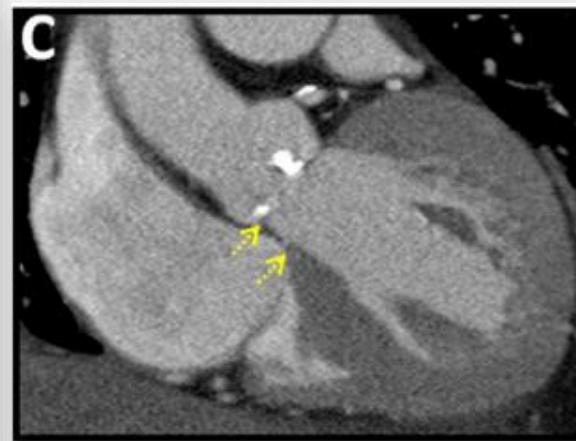
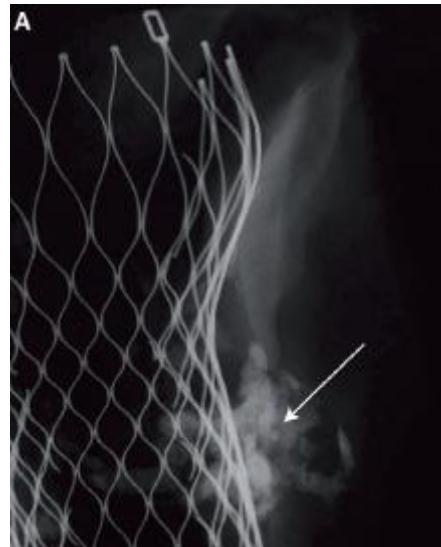


Figure 8. This original monograph from Tawara (1906)<sup>32</sup> shows the left bundle branch exiting below the base of the interleaflet triangle separating the noncoronary and right coronary leaflets of the aortic valve and fanning out to descend along the septal surface of the left ventricular myocardium.

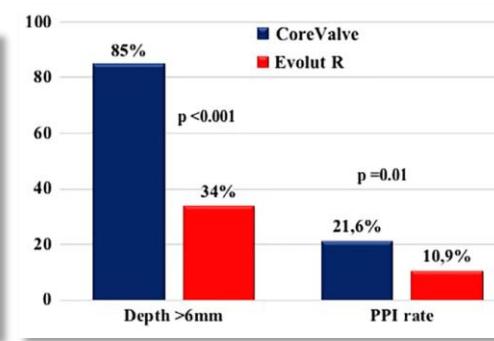
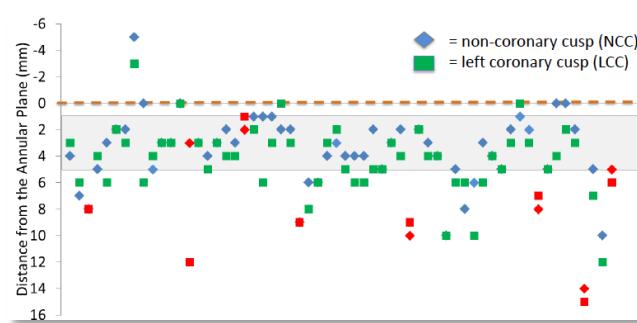
# Mechanisms of LBBB after TAVI

- ✓ Stent frame of the device may exert a mechanical stress on the conduction system
- ✓ Calcium of the landing zone displaced during TAV deployment
- ✓ Oedema, ischemia, inflammation related to TAVI (transient effect)

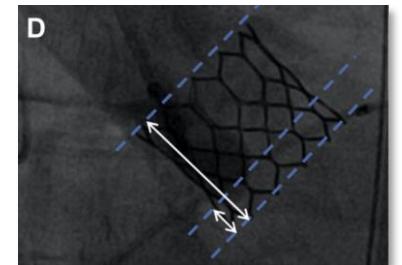
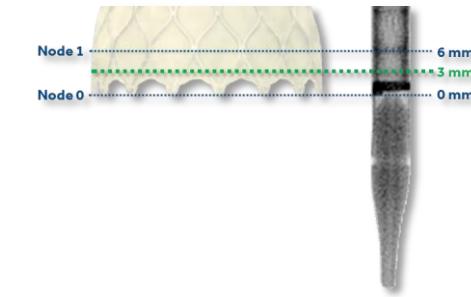


# Risk factors for new-onset LBBB

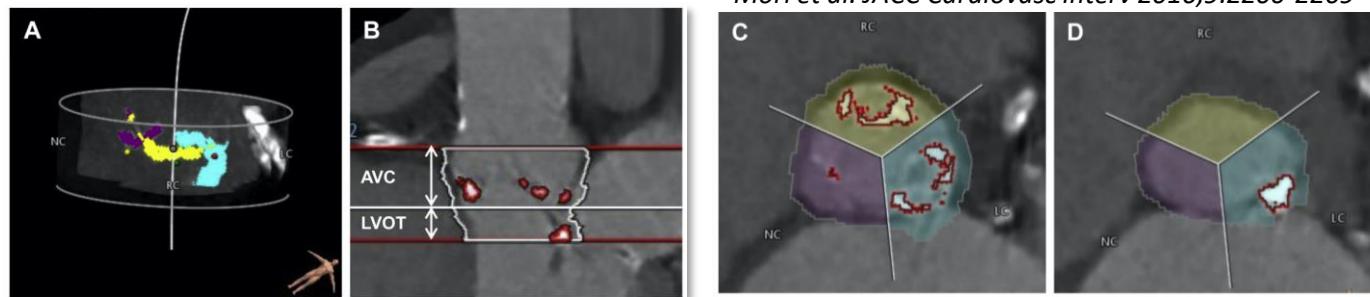
## ✓ Depth of implant



Ojeda et al. Cath Cardiovasc Interv 2020;95:783-790



## ✓ Amount of calcium in the landing zone



Mori et al. JACC Cardiovasc Interv 2016;9:2200-2209

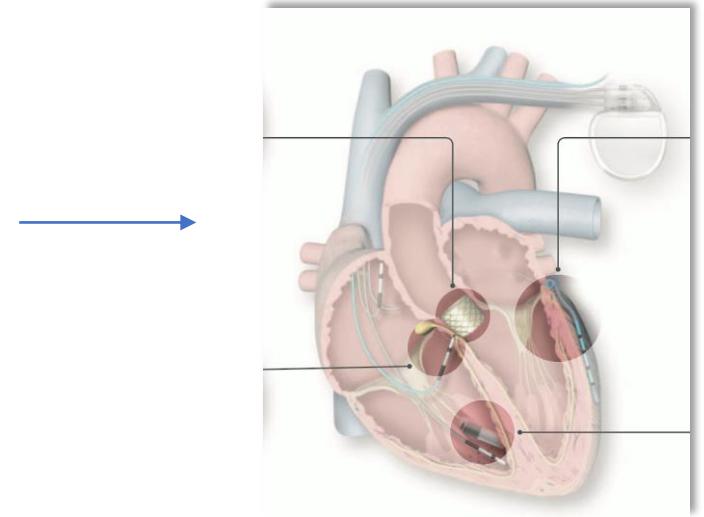
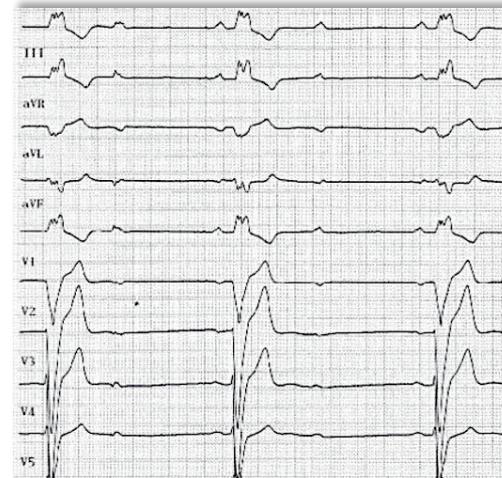
## ✓ Degree of oversizing

## ✓ Self-expanding vs balloon expandable device

# Risks of LBBB after TAVI

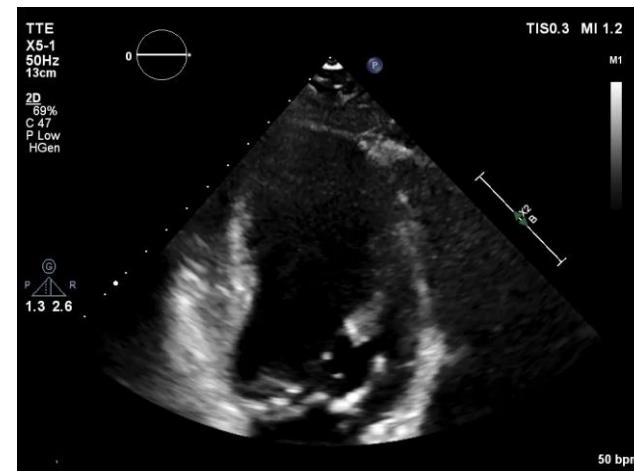
1.Risk of high degree AV bloc

✓ Need for permanent PCMK



2.Risk of LV function deterioration

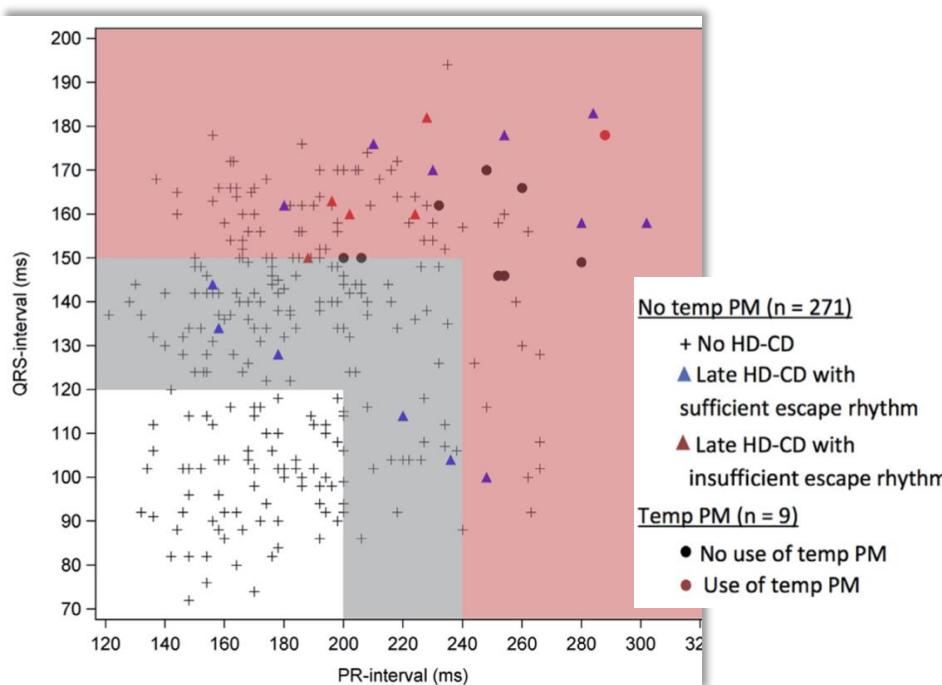
✓ dyssynchrony



3.Risk of mortality

# 1. Risk of high degree AV block, need for PCMK

- ✓ Wide range of PCMK implantation in case of new-onset LBBB after TAVI
- ✓ HD-AVB = second degree Type 2 or third degree (complete) AVB
- ✓ Recent studies investigated the risk of high degree AVB in case of new-onset LBBB induced by TAVI.



467 patients 2015-2017

**Sinus Rythm** without RBBB

Based on the first ECG recorded after TAVI

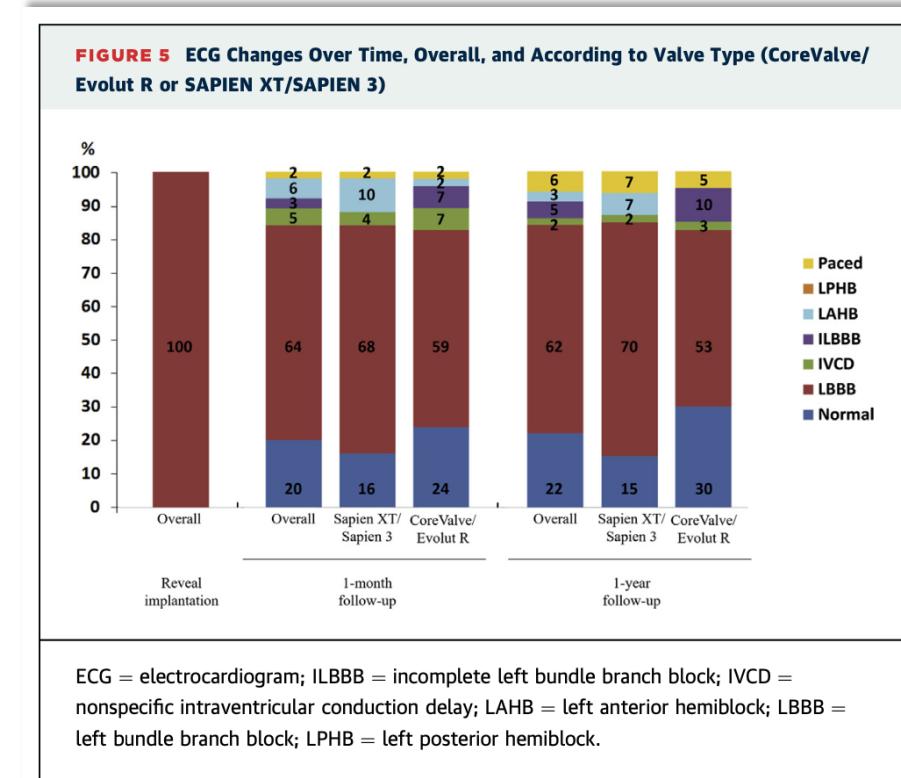
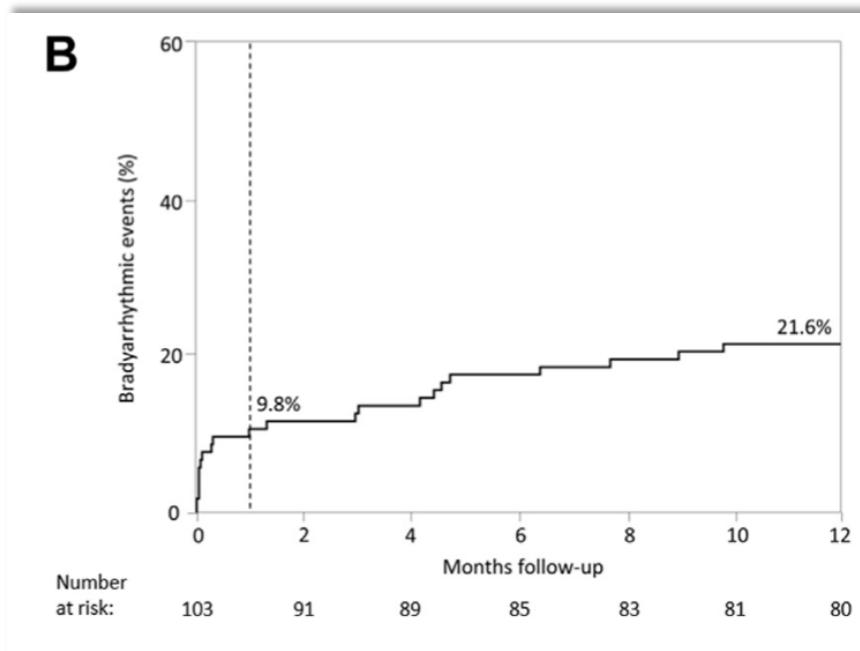
The risk of HD-AVB increased with higher PR and QRS interval  
(OR 1.26, p=0.002 and OR 1.41, p=0.016 respectively)

**Risk of HD-AVB is low in case of PR<240 msec and QRS < 150 msec (4.6%)**

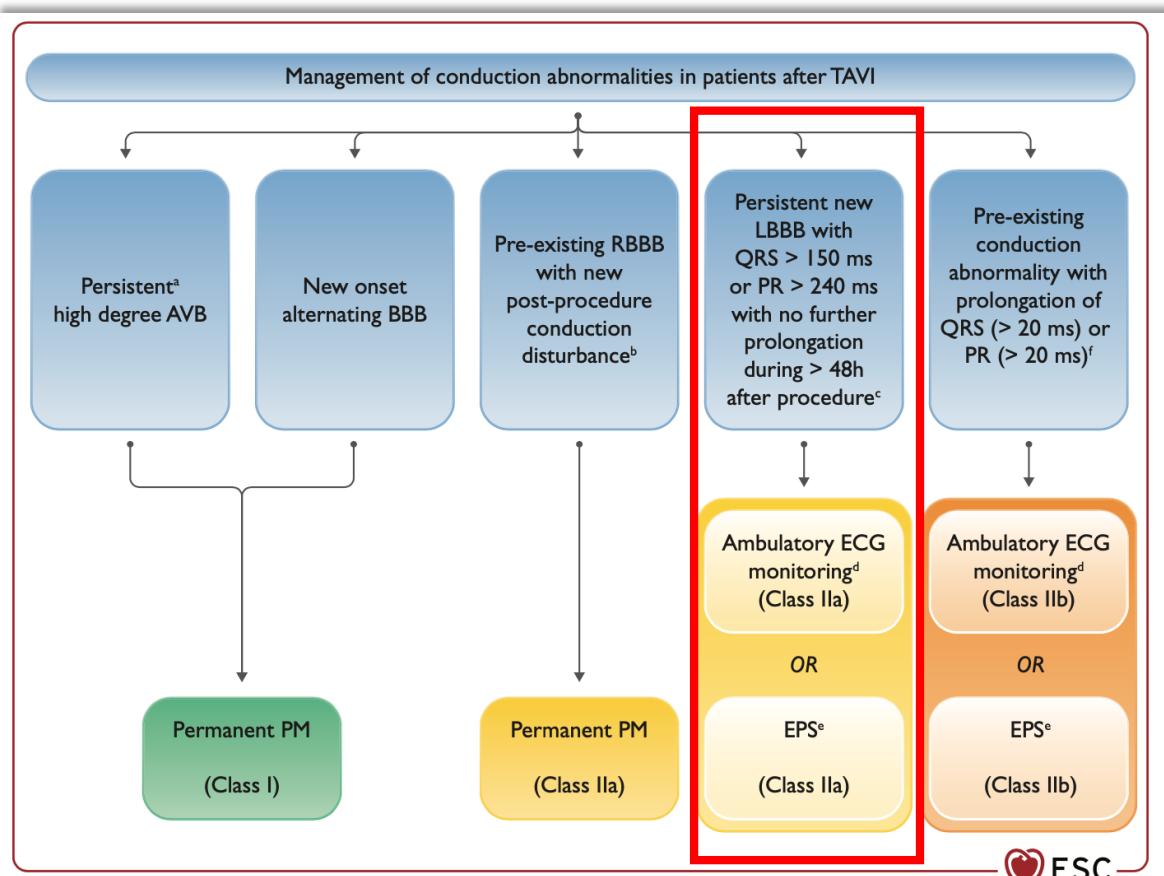
**In case of Afib without RBBB, the risk is low in case of QRS < 140 msec**

# Persistent LBBB after TAVI: insights from Reveal

- ✓ Ambulatory continuous cardiac monitoring during 12 months
- ✓ Bradyarrhythmia observed in 1/5 of patients (76% asymptomatic)
- ✓ PCMK 10% - Mortality: 12% @ 1 year
- ✓ Sudden death: 1%



## 2021 ESC Guidelines on cardiac pacing and cardiac resynchronization therapy

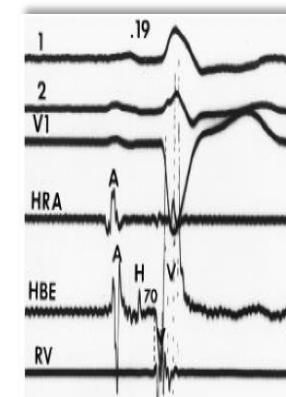
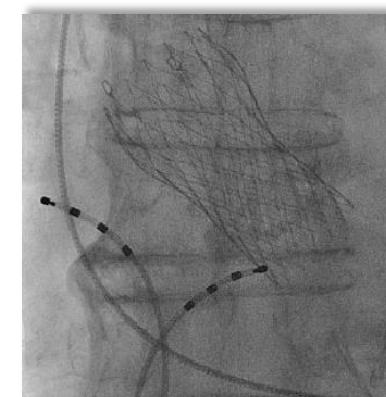


### New-onset and persistent LBBB after TAVI

- ✓ Patients with QRS < 150 msec: no further evaluation
- ✓ No systematic PCMK (real need 7-17%)

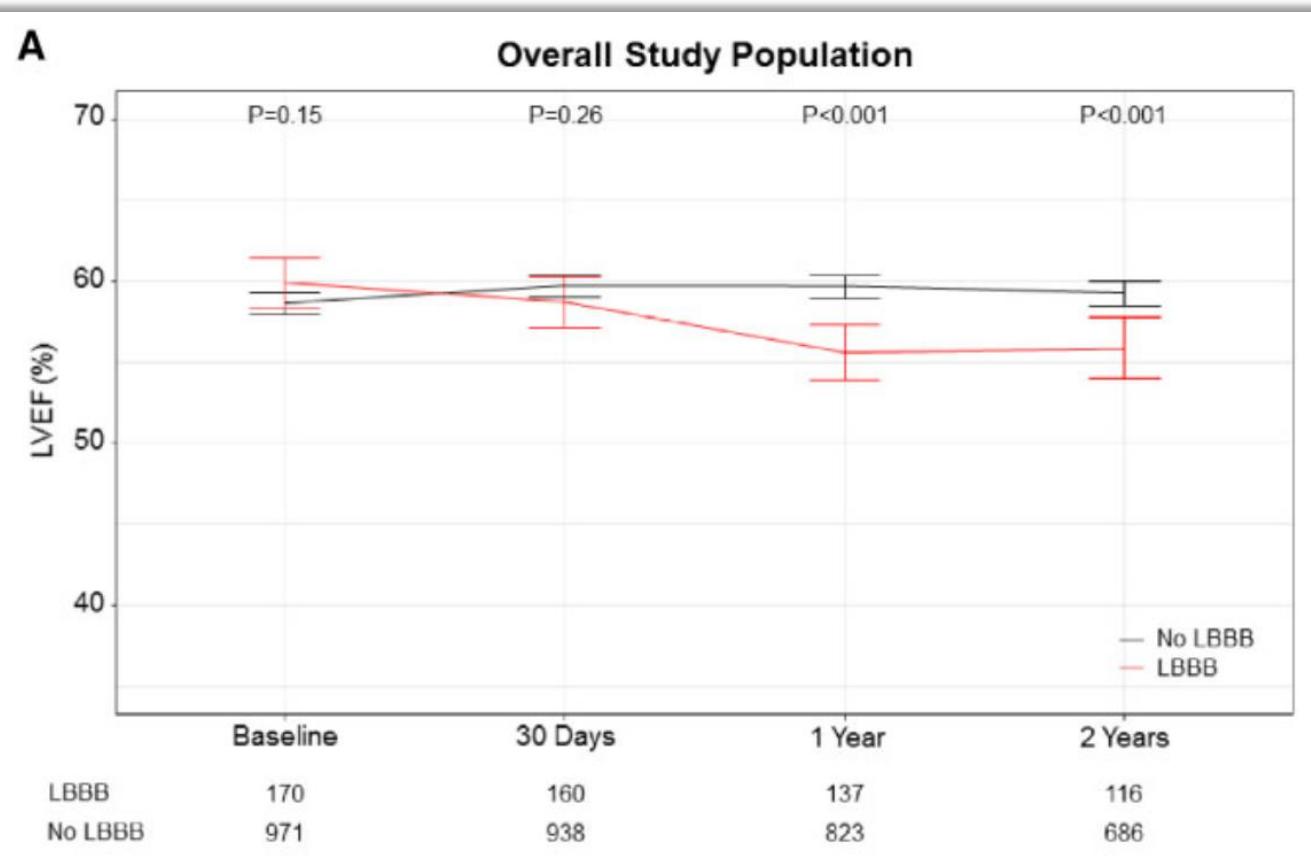
an approach using long-term ambulatory monitoring (implantable or external) or electrophysiology study (EPS) in lieu of direct permanent pacemaker implantation should be considered. Accordingly, the predictive value of a single EPS early after the procedure to predict advanced heart block needs further evaluation.

<sup>e</sup>EPS with HV ≥70 ms may be considered positive for permanent pacing.



Courtesy JB Le Polain

## 2.Risk of LV dysfunction



### PARTNER 2 trial:

1179 intermediate risk pts  
No pre-existing conduction abnormalities  
**15% new-onset LBBB**  
Fup 2 years  
New PCMK: 12%

### New-onset persistent LBBB after TAVI:

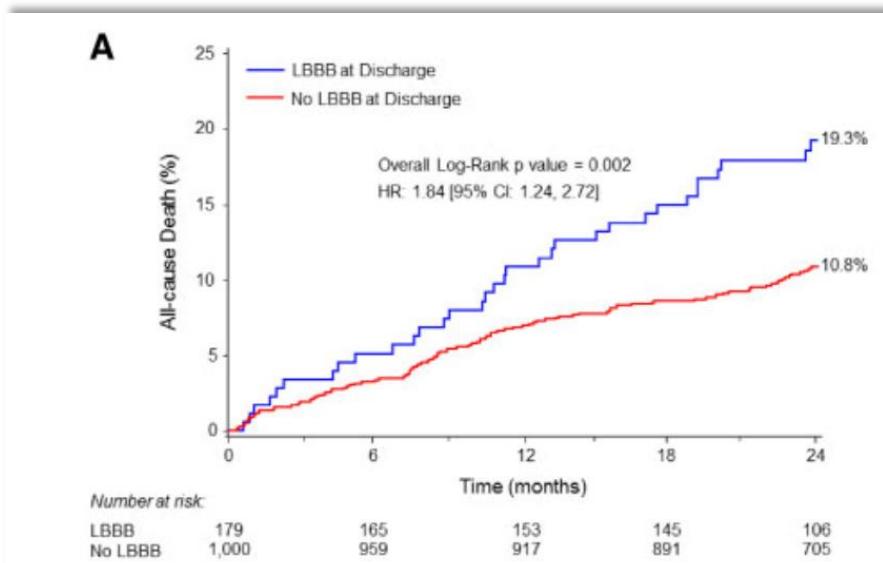
- Decline of LVEF at 1 and 2 years
- Enlargement of LV (EDLV volume)
- In case of baseline low EF, less recovery

# 3.Risk of mortality

**New-onset left bundle branch block after transcatheter aortic valve replacement is associated with adverse long-term clinical outcomes in intermediate-risk patients: an analysis from the PARTNER II trial**

Tamim M. Nazif<sup>1,\*</sup>, Shmuel Chen<sup>2</sup>, Isaac George<sup>1</sup>, Jose M. Dizon<sup>1</sup>, Rebecca T. Hahn<sup>1</sup>,

New-onset LBBB independent predictor of 2-yr mortality (HR 2.09, p< 0.001)

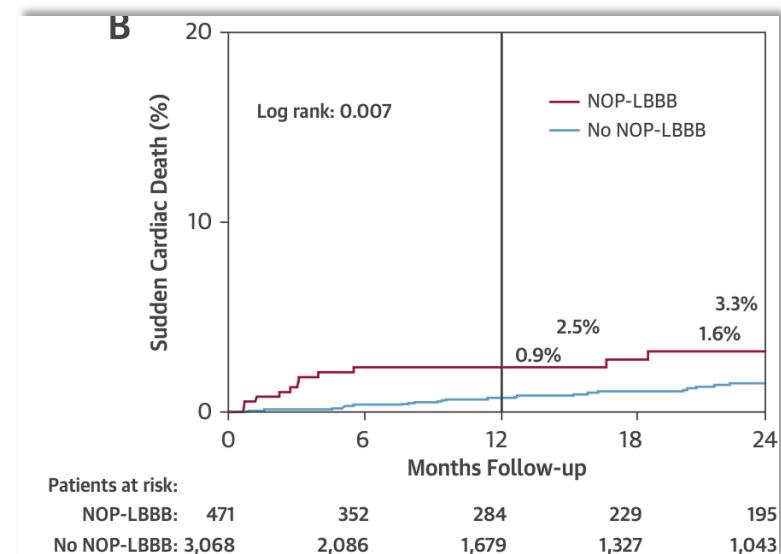


**Late Cardiac Death in Patients Undergoing Transcatheter Aortic Valve Replacement**

Incidence and Predictors of Advanced Heart Failure and Sudden Cardiac Death

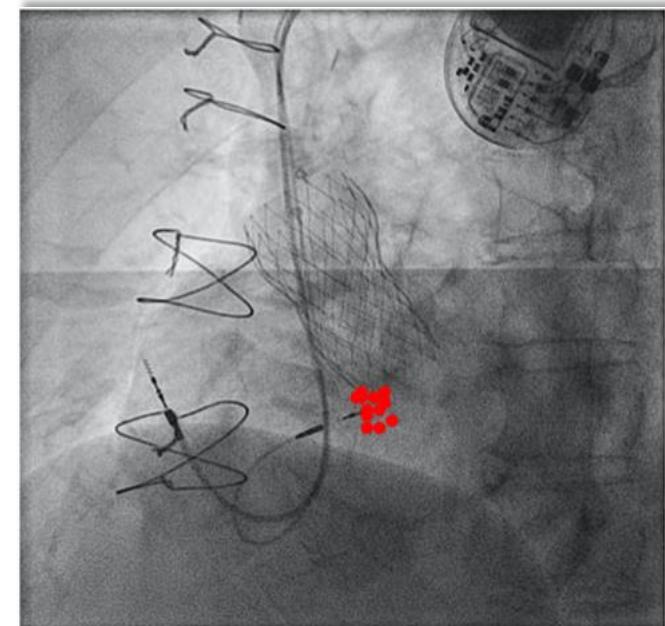
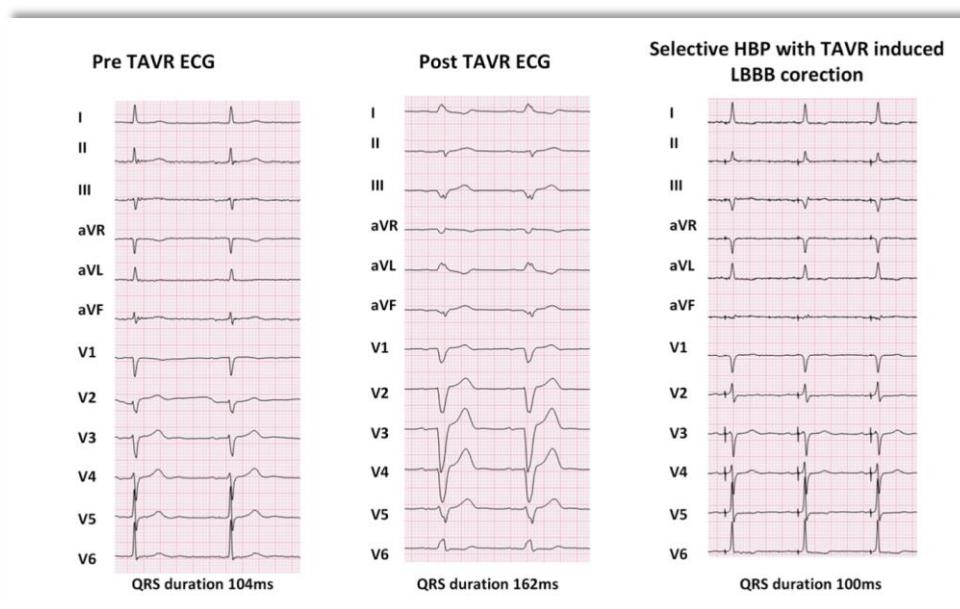
Marina Urena, MD,<sup>\*</sup> John G. Webb, MD,<sup>†</sup> Helene Eltchaninoff, MD,<sup>‡</sup> Antonio J. Muñoz-Garcia, MD, PhD,<sup>§</sup>

3726 patients, multicentric, Fup 22 months  
NO-persistent LBBB independent predictor of sudden cardiac death (HR 2.26, p=0.009)  
NO-LBBB + QRS>160 msec: HR 4.78, p=0.006



# How to pace a patient with LBBB after TAVI

- ✓ Right ventricular pacing induces dyssynchrony
- ✓ Cardiac Resynchronization Therapy (CRT) could correct electromechanical dyssynchrony and increase cardiac output
- ✓ Leadless pacing could be an option in patients without axillary access, requiring a single-chamber pacing
- ✓ His Bundle Pacing (HBP) can restore more physiological electrical activation and shorten QRS duration



# LBBB after TAVI: Conclusions

- ✓ New-onset persistent LBBB is the most frequent conduction disorder observed and induced by TAVI
- ✓ Procedural strategy can partially mitigate the incidence
- ✓ NO-LBBB increases the risk of permanent PCMK, LV dysfunction and death
- ✓ Threshold for PCMK should be kept at a low level; QRS<150 msec: no action
- ✓ **QRS>150 msec** and **PR>240 msec** should be investigated by monitoring or EPS (**HV > 70 msec**)
- ✓ Mode of pacing should be discussed with the EP team, adapted to the patient
- ✓ Narrow QRS: a new target after TAVI?