

# Intrinsic Atrioventricular Node Conduction Recovery After Transcatheter Aortic Valve Implantation and the Permanent Pacemaker Implantation Enigma

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The prevalence of degenerative valvular diseases such as aortic stenosis has continued to rise due to an increase in the aging population globally [1, 2]. Transcatheter aortic valve implantation (TAVI) has emerged to the forefront of severe aortic stenosis treatment, starting with high-risk surgical patients [1, 2]. The minimally invasive approach of TAVI, as established from the promising results of Placement of AoRTic TraNscathetER (PARTNER) trial, is now accepted as the standard of care for patients in high and intermediate surgical risk subgroups in the treatment of severe aortic stenosis [1, 2].

However, TAVI involves several adverse effects and has been associated with a high rate of complete atrioventricular (AV) block development [1, 2]. The main issue is the iatrogenic injury to the AV conduction system after the bioprostheses implantation due to its proximity to the aortic root [1, 2]. Several patient- and procedure-related factors have been associated with permanent pacemaker (PPM) implantation after TAVI and include advanced age, male gender, atrial fibrillation, calcification of aortic and mitral annulus, small left ventricular outflow tract (LVOT), pre-existence of a right bundle branch block or intraprocedural conduction disorders, balloon pre-dilation, valve type and depth of prosthesis implantation [3, 4] (Table 1).

The need for pacemaker implantation after TAVI seems to remain an unresolved issue. PPM implantation after TAVI has been linked to increased length of intensive care unit and hospital stay post procedure, increased overall mortality and

exacerbation of heart failure [5]. Current studies and guideline recommendations though suggest a more conservative approach under watchful waiting after TAVI, because some patients present temporary AV conduction disturbances that may recover over time [3-8].

A recent study of 1,198 TAVI patients by Gaede et al analyzed the predictors of third-degree AV block persistence with concurrent PPM dependency after TAVI [3]. The study concluded that the long-term persistence of third-degree AV block is generally low after TAVI. Therefore, it may be wise to postpone the indication for PPM implantation for a couple of days [3].

A retrospective analysis by Scherthaner et al evaluated the incidence of high-grade AV block after TAVI and the percentage of ventricular pacing and pacemaker dependency at the first 6 - 8 weeks after implantation and concluded that more than half of the patients were not strictly pacemaker-dependent, but presented an underlying intrinsic rhythm [4].

Additionally, Marzahn et al investigated the recovery of AV node conduction in 856 TAVI cases [6]. The study concluded that 45% of pacemaker patients showed sufficient AV node conduction after pacemaker reprogramming at follow-up [6].

Current guidelines from the European Society of Cardiology (ESC) recommend a period of clinical observation up to 7 days in order to assess whether the rhythm disturbance is transient and can be resolved [7]. The 2017 American College of Cardiology Expert Consensus Decision Pathway suggests routine electrocardiography assessment due to a potential need for pacemaker implantation beyond the initial 30-day period, particularly following implantation of the self-expanding TAVI [8].

All in all, a significant number of patients implanted with a device are not strictly pacemaker-dependent, but present an underlying intrinsic rhythm, indicating that temporary AV conduction abnormalities may recover over time [3-6]. Careful judgment is also required as far as the best timing of pacemaker implantation is concerned. Regular pacemaker interrogations including reprogramming could avoid unnecessary permanent right ventricular stimulation [6]. The use of implantable loop recorders after discharge can allow closer monitoring and avoid longer hospitalization times.

TAVI has become a well-established treatment for patients with severe aortic stenosis. Surgical aortic valve replacement (SAVR) is a safe procedure, particularly for patients at low risk [9]. After isolated SAVR, PPM implantation for conduc-

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**Table 1.** Risk Factors for Complete Atrioventricular Block After Transcatheter Aortic Valve Implantation [3, 4]

Pre-existing right bundle branch block (RBBB)
New onset left bundle branch block (LBBB)
Self-expandable valve
Depth of valve implantation
Left ventricular outflow tract (LVOT) oversizing
Prosthesis overexpansion
LVOT calcification

tion disturbance is rare (1.5%) in comparison to the 17% implantation average rate after TAVI [9]. It is therefore imperative that the benefits of the TAVI procedure be weighed against the increased risk of the need for PPM relative to a low-risk SAVR [9].

The necessity to assess the risk of PPM implantation when choosing a procedure for aortic stenosis is of utmost importance. The final treatment decision should be individualized using clinical evaluation by the multi-disciplinary team (“heart team” approach), patient goals and expectations, and risk category, as advocated by current guidelines [7, 8]. As conduction disturbances may be transient and resolve, careful judgment is required as far as the optimal treatment strategy is concerned.

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## Conflict of Interest

No author has any conflict of interest to disclose.

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