



ORIGINAL ARTICLE

## Permanent pacemaker implantation after aortic valve replacement: Long-term dependency or rhythm recovery?



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### KEYWORDS

Aortic valve replacement;  
Permanent pacemaker;  
Conduction disorder

### Abstract

**Introduction:** Conduction disturbances requiring permanent pacemaker (PM) implantation occur in 3–12% of patients after aortic valve replacement (AVR). Our aim was to assess long-term PM dependency and its predictors in these patients.

**Methods:** We conducted a retrospective study of all consecutive patients undergoing permanent PM implantation after AVR between January 2004 and December 2010. Absence of sinus rhythm or atrial fibrillation with appropriate ventricular response at a pacing rate of 30 bpm for 10 s was defined as pacemaker dependency.

**Results:** Ninety-one patients underwent permanent PM implantation and during follow-up (1026.6±732.0 days) 64% of them did not recover rhythm. Age, conduction disorders on the preoperative ECG, negative chronotropic medication before surgery, cardiopulmonary bypass and aortic cross-clamp times did not influence rhythm recovery. In multivariate analysis, valvular disease etiology related to endocarditis, prosthetic dysfunction and bicuspid valve were associated with long-term PM dependency (OR 5.05; CI: 1.43–17.75).

**Conclusions:** The majority of patients undergoing permanent PM implantation after AVR did not recover from conduction disorders during follow-up. The etiology of valvular disease was an independent predictor of late PM dependence.

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**PALAVRAS-CHAVE**

Substituição valvular  
aórtica;  
Pacemaker  
permanente;  
Distúrbios  
da condução

## Implantação de *pacemaker* permanente após substituição da válvula aórtica: dependência a longo prazo ou recuperação de ritmo?

**Resumo**

**Introdução:** Distúrbios da condução que requerem implantação de *pacemaker* (PM) permanente após a substituição da valva aórtica (SVA) ocorrem em 3-12% dos doentes. O objetivo do estudo foi avaliar a dependência do PM a longo prazo e os seus preditores neste grupo de doentes.

**Métodos:** Foi realizado um estudo retrospectivo de todos os doentes submetidos a implantação de PM definitivo após SVA entre janeiro de 2004 e dezembro de 2010. A ausência de ritmo sinusal ou fibrilação auricular com frequência ventricular adequada sob PM a 30 batimentos/min durante um curto período de 10 segundos foi definido como dependência de PM.

**Resultados:** Noventa e um pacientes foram submetidos a implantação de PM permanente e durante o período de *follow-up* (1026,6 ± 732,0 dias) 64% deles não recuperaram o ritmo. A idade, os distúrbios de condução no ECG pré-operatório, uso de medicação cronotrópica negativa antes da cirurgia, o tempo de circulação extracorporeal e o tempo de clampagem da aorta não influenciaram a recuperação do ritmo. Na análise multivariada, a etiologia da doença valvular (endocardite, disfunção de prótese ou válvula bicúspide) esteve associada à dependência de PM a longo prazo (OR 5,05; IC: 1,43-17,75).

**Conclusões:** A maioria dos doentes submetidos a implantação de PM permanente após SVA não recupera dos distúrbios de condução durante o *follow-up*. A etiologia da doença valvular foi um preditor independente da dependência de PM a longo prazo.

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**Introduction**

Conduction disturbances requiring permanent pacemaker (PM) implantation occur in 3–12% of patients after surgical aortic valve replacement (AVR).<sup>1</sup> There is evidence suggesting that these disturbances may improve over time, but little is known about predictors of that improvement.<sup>2–5</sup> Understanding the risk factors for PM dependency may influence the timing of implantation, encouraging early PM implantation in selected patients and avoiding unnecessary implantations in others. The aim of this study was to assess long-term PM dependency and its predictors in patients undergoing AVR.

**Methods**

We conducted a retrospective study of all consecutive patients undergoing permanent PM implantation after AVR between January 2004 and December 2010 in our tertiary institution. Patients who underwent associated interventions such as other valve replacement, coronary artery bypass grafting or myectomy were included in the study. Data were obtained from patient files including pacemaker records. Follow-up assessment was defined by the last assessment of the PM. Patients were categorized as pacemaker-dependent or non-dependent. Absence of sinus rhythm or atrial fibrillation with appropriate ventricular response at a pacing rate of 30 bpm for 10 s was defined as pacemaker dependency. Whenever information was not complete, patients were reassessed by a cardiologist specializing in pacing. Patients who had a formal indication for pacemaker implantation before surgery and those who had

the device implanted 60 days or more after surgery were excluded.

Differences in demographic and clinical characteristics were compared in two groups of patients, according to the occurrence or not of long-term rhythm recovery, using the chi-square test or Fisher's exact test, as appropriate. A multivariate logistic regression model was fitted to estimate odds ratios (OR) and 95% confidence intervals (CI) in order to estimate the independent effect of baseline characteristics. Two-sided p values of <0.05 were considered statistically significant. The statistical analysis was performed using Stata<sup>®</sup>, version 11.2 (Stata Corporation, College Station, Texas, USA).

**Results**

Between January 2004 and December 2010, a total of 2254 consecutive patients underwent AVR at our institution. Ninety-one patients, mean age 66±13 years, underwent permanent PM implantation a mean of 10.4±4.7 days after surgery. The leading indication for pacemaker implantation was complete atrioventricular block in 85 patients (93%), followed by slow atrial fibrillation (3%) and other atrioventricular conduction disturbances (3%). The majority of patients underwent more than one surgical procedure; 41% of patients underwent isolated aortic valve replacement (Table 1).

During a mean follow-up of 1026.6±732.0 days, 64% of patients did not recover rhythm. Table 2 shows the incidence of long-term PM dependency according to demographic and clinical variables. Age, gender, negative chronotropic medication before surgery and previous history of cardiac surgery

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