Prevalence and prognostic value of significant mitral regurgitation development after pacemaker implantation

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Background: Mitral regurgitation (MR) is one of the complications after pacemaker (PM) implantation. However, the underlying mechanism leading to MR progression after PM implantation is not yet fully understood. There is also a lack of information on the clinical impact of the development of MR after PM implantation.

Purpose: This study aims to evaluate the prevalence and mechanism of MR progression after PM implantation and to determine its prognostic value.

Methods: Patients who underwent de novo PM implantation at our university medical centre between 2010 and 2020 were included. Patients with previous mitral valve surgery, transcatheter edge-to-edge repair, or MR severity ≥ moderate before device implantation were excluded. The development of significant MR was defined as a worsening of MR severity ≥ moderate within five years after PM implantation. Clinical endpoints were defined as a composite of all-cause mortality or heart failure hospitalization.

Results: A total of 451 patients (mean age 69 ± 15 years, 61% male) were included. High-degree atrioventricular block (76%) was the main indication for PM implantation. Dual-chamber PM was implanted in 370 (82%) patients. The development of significant MR occurred in 131 (29%) patients at a median of 2.4 years [interquartile range (IQR): 1.0-3.8 years] after PM implantation. Multivariate logistic regression analysis demonstrated that implanted single-chamber PM, LV end-systolic volume index (LVESVI), and mild MR (vs no MR) at baseline were independently associated with the development of significant MR. Prespecified endpoints occurred in 143 patients (31.7%) during median follow-up of 5.4 years [IQR: 3.0-8.1 years] after PM implantation. The Kaplan-Meier analysis showed that patients with significant MR after PM implantation had a significantly higher incidence of endpoints than those without. (Figure) Multivariate Cox regression analysis demonstrated that the development of significant MR, age, male gender, and diabetes mellitus were independently associated with the occurrence of the combined endpoints. The development of significant MR had significant incremental prognostic value for the composite endpoints over the multivariate models including a decrease in LV ejection fraction of ≥ 10% (p = 0.008) or an increase in LVESVI of ≥ 20% (p = 0.016) after PM implantation.

Conclusions: The development of significant MR occurred in 131 patients after PM implantation. The development of significant MR was independently associated with cardiac events, and its prognostic value was also significant even when included in models including a decrease in LV ejection fraction or an increase in LVESVI after PM implantation.
Figure: Kaplan-Meier Curve

No development of significant MR

Development of significant MR

Log-rank
$p < 0.0001$

Event free rate

Number at risk

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