

## Long-term follow-up of heart transplant patients treated with permanent pacemaker: a monocentric study

Tua L.<sup>1</sup>; Turco A.<sup>1</sup>; Acquaro M.<sup>1</sup>; Scelsi L.<sup>1</sup>; Greco A.<sup>1</sup>; Ghio S.<sup>1</sup>; Savastano S.<sup>1</sup>; Sanzo A.<sup>1</sup>; Vicentini A.<sup>1</sup>; Petracci B.<sup>1</sup>; Vullo E.<sup>2</sup>; Vicini Scajola L.<sup>1</sup>; Pelenghi S.<sup>3</sup>; Oltrona Visconti L.<sup>1</sup>; Rordorf R.<sup>1</sup>

<sup>1</sup>Policlinic Foundation San Matteo IRCCS, Cardiology Department, Pavia, Italy

<sup>2</sup>San Gerardo Hospital, Cardiology Department, Monza, Italy

<sup>3</sup>Policlinic Foundation San Matteo IRCCS, Cardiothoracic Surgery, Pavia, Italy

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### Background and purpose

Permanent pacemaker implantation (PPMi) is needed in about 5% of patients following heart transplant (HTx) primarily due to sinus node dysfunction (SND), which commonly occurs in an early phase, or to atrio-ventricular block (AVB), which is common later on. Currently, data on rate of ventricular pacing (VP) is lacking and little is known on long-term outcomes after PPMi.

**Methods:** This was a retrospective, monocentric study. Among 1123 patients treated with HTx, all with biatrial technique, from november 1985 to march 2019 at our institution, 61 (5.4%) patients needed PPMi. PM parameters, clinical and echocardiographic data were collected at 1 month and at 1-3-5-10 years follow-up. The primary aim was to analyse the percentage of right ventricular pacing in the overall population and in subgroups stratified by the timing of PPMi and by pacing indication. Secondary endpoints were to analyze long-term outcomes according to the percentage of ventricular pacing and to the type of implanted PM (single vs. dual chamber).

**Results:** Among patients treated with PPMi (68.9% single-chamber), 62.2% were implanted for SND and 36% for AVB. Early PPMi (< 3 months after HTx), occurred in 34.4% of patients, mainly due to SND, while late PPMi (> 3 months after HTx) occurred in 65,6% with an equal distribution between SND and AVB. Median follow-up time from HTx was 140 months and 82 months from PPMi. Overall mean rate of VP was 21%. Rate of VP was higher in patients implanted early rather than late after HTx, both at 1 month (91% vs 2%, P = 0,002) and at 1 year after the procedure (43 vs 1, P = 0,037). Patients with AVB had a greater rate of VP compared to those implanted for SND, irrespective of timing of implantation and these findings were still present at 3 and 5 years follow-up (62 vs 1%, P = 0,011 at 3 years and 80 vs 6%, P = 0,002 at 5 years). VP declined progressively after PPMi implantation. No differences were observed in terms of 10-years mortality between early vs late PPMi, dual vs single-chamber and mean VP > 21% vs ≤ 21%.

**Conclusions:** Patients treated with PPMi after HTx show on average low percentage of VP over long-term follow-up. AV block indication and early implantation are associated with a higher percentage of VP. The rate of VP, the timing of PPMi and the use of single vs dual chamber PM do not affect overall prognosis or left ventricular systolic function. Our data may justify implantation of a single-chamber PPMi, which bears less complications and procedural time, in the majority of HTx patients needing PPMi.