Longevity Prediction Performance of Pacemaker Systems

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Introduction: One of the most important information to the patients with pacemaker is the remaining longevity of pacemaker generators. In general, we rely on the predicted battery life expectancy provided by pacemaker system manufacturers. However, there was little information for the reliability of longevity prediction.

Methods: We retrospectively reviewed the patients with pacemaker system who received generator replacement due to reaching elective replacement indicator (ERI) from January 1, 2013 to June 30, 2018. Patients had both records of one year of remaining longevity and ERI were selected. Patients without longevity or ERI records, and who received generator replacement due to reasons other than ERI were excluded. We calculated the time intervals between the date indicating one-year longevity remaining and ERI date (time from index to ERI, TIE).

Result: A total of 170 patients received pulse generator replacement for any reason during the study period. Of these, 95 patients were excluded, and 75 patients were enrolled in the final analysis. [Age 68.4 ± 12.7 years, female 41 (54.7%), dual chamber device 41 (54.7%)]. The average expected longevity at 1 year was 12.3 ± 5.12 months and the TIE was 8.4 ± 4.22 months (minimum 1.8 months, maximum 23.3 months, Figure). Mean difference was 3.9 ± 6.63 months and it was statistically significant (P < 0.001). The dual chamber device and single chamber device showed 12.7 ± 6.68 months and 11.7 ± 2.04 months of TIE, respectively. TIEs were 3-4 months shorter than expected longevity (7.8 ± 3.06 months in dual chamber device (P<0.001); 9.1 ± 5.25 months in single chamber device (P=0.004)). Activation of rate response pacing mode (R-mode) did not affect the prediction ability of the device longevity (R-mode ON, 4.0 ± 7.01 months; R-mode OFF, 3.3 ± 3.33 months; P=0.784).

Conclusion: The longevity prediction of pacemaker systems was longer than the actual time interval from the date indicating 12 months of predicted longevity to the date of ERI. Therefore, the patients with pacemaker longevity < 12 months required more frequent and vigilant observation.