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The energy cost of His bundle pacing can be curtailed

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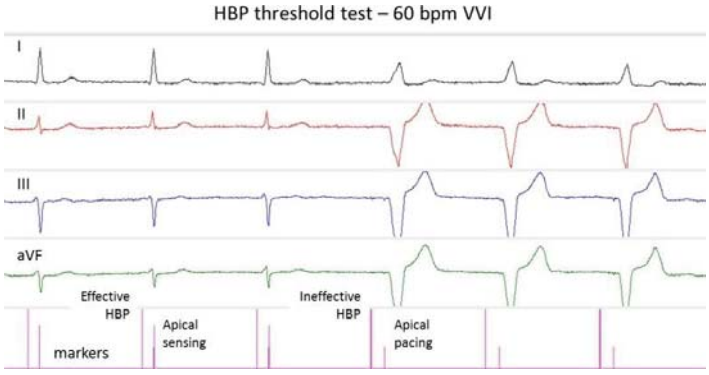
Introduction: His bundle pacing (HBP) allows physiological ventricular activation and prevents the electrical and mechanical desynchronization generally induced by myocardial stimulation, which can increase the risk of atrial fibrillation and heart failure. On the other hand, reliable HBP capture often requires higher energy than conventional myocardial pacing. This reduces the expected life of the stimulator and might limit the diffusion of HBP in the clinical practice.

Purpose: Decreasing HBP current drain by careful management of stimulation safety margin and pulse duration.

Methods: In 28 patients undergoing DDD pacing with HBP, a third lead was implanted in RV apex to provide back-up pacing on demand. HBP and apical leads were connected, respectively, to the V1 and V2 channels of a 3-chamber stimulator. When HBP was effective, apical sensing occurred within the VV delay and prevented V2 stimulation. In contrast, in case of HBP failure, V2 sensing was missing and apical back-up pacing was promptly delivered at the end of the VV delay. The availability of a back-up pulse on demand allowed reducing the HBP safety margin with no risk. Furthermore, the individual HBP strength-duration curve was derived in the aim of optimizing the Hisian pulse parameters, which are the major determinants of the device current drain.

Results: Correct back-up inhibition by successful HBP and stimulation in the event of capture loss was achieved in all the patients. The latency from Hisian pacing to apical sensing averaged 96±14 ms. According to the pacemaker counters, no back-up pulse was delivered in daily life in 59% of patients. In the remaining, the prevalence of back-up stimulation never exceeded 15% of paced ventricular cycles. The high HBP threshold was essentially due to an increased rheobase (1.2±0.6 V), while the chronaxie ranged from 0.30 to 0.53 ms in 71% of patients (median 0.44 ms), exceeding 0.6 ms only in 29% of the cases. An average current saving of 5.4±3.0 μA was obtained at the expense of a mild reduction in HBP safety margin (from 1.6±0.2 to 1.4±0.1 times).

Conclusions: Back-up stimulation on demand is a reliable option to decrease HBP current drain and prolong the stimulator service life with full safety. In most of the cases, significant saving can be achieved by pulse shortening, as the chronaxie time is in the same range as with myocardial stimulation and longer pulses are not required. A pulse duration exceeding 0.6 ms is indicated in less than 1/3 of the implants.



HBP and apical back-up