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Short Communication
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When a Self-Paced Promotion Algorithm Changes a Patient's Quality of Life

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Short Communication

The case of a female patient, currently 22 years old, is presented. When she was 18 months age old, the background of inter atrial communication was corrected. At age of 8, she presented refractory Atrial Flutter (AF), and in December 2006 catheter ablation was performed, achieving AF reversal evolving with sinus dysfunction. In August 2007, a Maze procedure and implant of a Cardiac Resynchronization Therapy (CRTP) with an epicardial approach due to recurrence of the AF (incisional) was performed (Figure 1).

In the evolution with echocardiographic controls, non-compact cardiomyopathy was diagnosed with severe dysfunction and is referred to the cardiac transplant service of our hospital for evaluation. It evolves in Functional Class I-II (FC) medicated with Enalapril, Amiodarone, Furosemide, Carvedilol, Acenocoumarol. In 2014 it presented an Ejection Fraction (EF) of 34%. In interconsultation with the EP Tech for technical control of the implantable device, its depletion (ERI) is observed and the result of the last echocardiogram shows an EF of 27% with a clear deterioration in FC. Impedance tests, sensing threshold and stimulation threshold are performed.

The electrocardiographic signal with narrowing of the QRS associated with resynchronization was not adequate. The optimization of the CRTP therapy with echocardiography is attempted by observing a marked improvement in echocardiographic parameters by stimulating in AAI mode; Threshold tests are performed in Biventricular stimulation mode only LV, only RV and in AAI mode. Atrial stimulation was optimal with a good threshold stimulation, in LV the threshold was raised as in RV where the threshold was 7 volts with width pulse of 0.5 msec (Figure 2).

It is considered that the patient is not responding to the CRTP and the replacement of the unit is considered the only way to resolve it because it is in Immediate Elective Replacement (ERI).

What would be the option of programming the cardiac stimulation device before the finding during the optimization attempt?

1. AV Search +
2. VIP
3. RYTHMIQ/MVP

Case Report: Analysis

The DAVID study was a multicenter controlled randomized clinical trial that evaluated two modalities of cardiac stimulation in patients who received an implantable automatic defibrillator [1]. Patients were randomized to a double-arm DDDR chamber with the range stimulation between 70 to 130 beats per minute and another arm in VVI stimulation mode with a backup frequency at 40 beats per minute. The results of this study showed worse evolution in terms of all-cause mortality or hospitalization for a new episode of heart failure in the DDDR arm 70 to 130, other studies reinforced the hypothesis of the benefit of the prevalence of the own rhythm over the stimulated in pacemaker patients [2-4].

The algorithms available in cardiac stimulation technology are the management of ventricular stimulation (MVP-Medtronic), extended hysteresis of AV search (Search AV +) or combined as RHYTMIQ (Boston Sc). These modes provide atrial stimulation with ventricular support. If AV conduction is lost, the device is designed to switch to DDDR or DDD mode. Periodic driving checks are performed and, if AV driving is resumed, the device returns to AAIR or AAI mode [5] (Figure 3).

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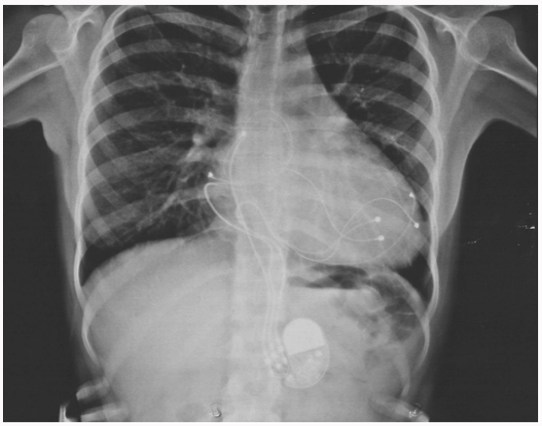

Figure 1: Chest RX (Front). CRTP epicardial implant.

The implantation of a device with intrinsic conduction promotion algorithms and operating in AAI (R) stimulation mode with VVI support during normal driving times was indicated, switching to DDD (R) mode when a conduction block is detected (RHYTMIQ/MVP). In the 24-h Holter and in serial electrocardiograms, the rhythm was stimulated in the Atrial at 100%, maintaining AV conduction with a prolonged PR interval, a correct ventricular sensing evolving with a marked clinical improvement, and despite the RBB with LHB the markers Echocardiography showed no dyssynchrony with an EF 50% (Figure 4).

Conclusion

The use of the algorithms developed to promote one's own rhythm, such as Search AV+, MVP, RHYTMIQ, are a tool that has proven the clinical benefit in multiple clinical trials, although the AV Search Hysteresis algorithm is sometimes insufficient, the availability

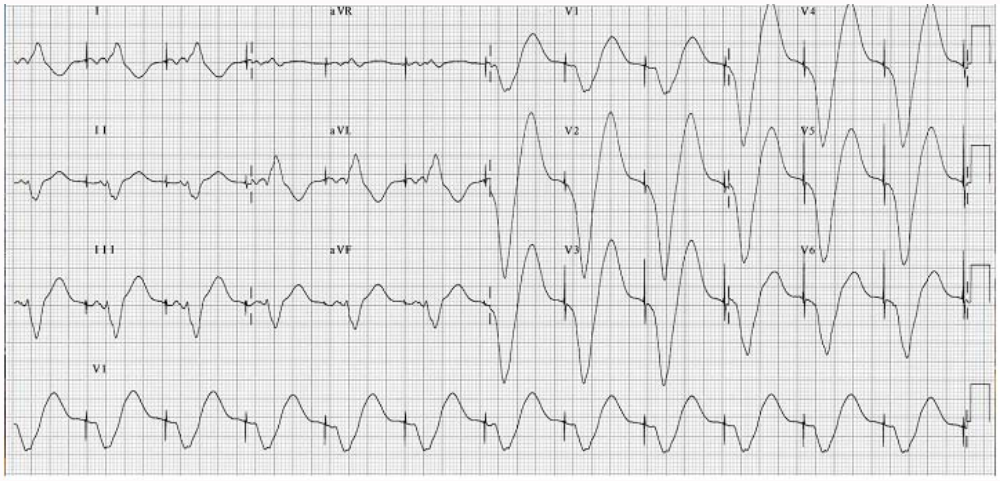

Figure 2: `ECG with CRTP with 100% capture without electrocardiographic resynchronization criteria. A very wide QRS with a duration of 400 msec is observed (see aVL and aVF to appreciate the duration of the QRS), with some degree of latency from the stimulation device.

Figure 3: Example of ventricular frequency management algorithm function ON.`

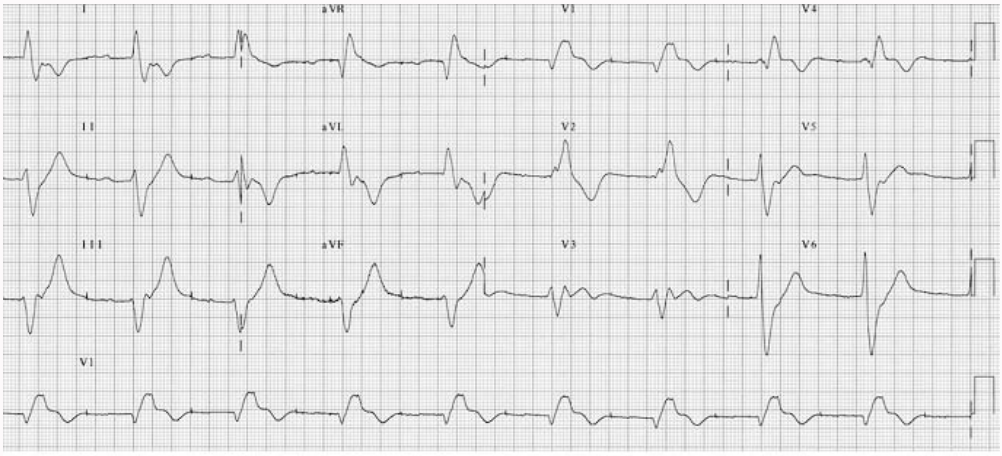

Figure 4: ECG with ON ventricular stimulation management algorithm, 100% atrial stimulation and 1:1 AV conduction with a QRS, also wide with 260 msec duration, with image of RBB and LHB. There is an important intra-atrial conduction disorder that is evidenced with a duration of the P wave from the spike of 220 msec in DII.

of additional algorithms seeks to compensate for its limitations to allow the highest percentage of own driving; it is extremely important to know in detail the operation, and application of these algorithms, the electrocardiographic recognition of functions that can be confused with sensing failures with alternation in stimulation cycles that are nothing other than the normal operation of an algorithm that can be very beneficial for the quality of life of complex patients such as the one presented as an example, and in others, in which unnecessary stimulation can worsen the clinical condition silently.

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