CASE REPORT

Inappropriate tachycardia at rest as a consequence of atrial preference pacing algorithm

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Abstract A 34-year-old female with a past medical history of sick sinus syndrome which requiring placement of single chamber (atrial) permanent pacemaker (Medtronic, Minneapolis, MN, USA). One year after pacemaker implantation, the patient reported exercise intolerance and palpitation at rest. Device interrogation during clinic visit revealed 99% atrial pacing and high atrial rate episodes. What is the mechanism for high atrial rate episodes? Atrial preference pacing (algorithm) is a promising method for preventing atrial tachyarrhythmia in patients with an implanted pacemaker. However, instead of using nominal search interval settings, which may not benefit patients, we should individually tailor the programming, identifying the most effective search interval and be aware of possible pro-arrhythmic effects.

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KEYWORDS
Preferential headset pacing; Permanent pacemaker; Ear tachyarrhythmias

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Case report

A 34-year-old female with a past medical history of atrial tachycardia ablations (five different foci were ablated in two different procedures) and sick sinus syndrome possibly due to secondary injury during ablation procedures, which required placement of a single chamber (atrial) permanent pacemaker (Medtronic, Minneapolis, MN, USA) at a different hospital. One year after pacemaker implantation, the patient reported exercise intolerance and palpitation at rest. Device was programed with a lower rate of 70 bpm, however on her resting electrocardiogram, rhythm was atrial paced, ventricular sensed with a heart rate of 94 bpm. Device interrogation (Figure 1) during clinic visit revealed 99% atrial pacing and high atrial rate episodes (EGM1 and EGM2; Figure 2 and Figure 3). What is the mechanism for high atrial rate episodes which is causing exercise intolerance and palpitation at rest?

Discussion

After careful examination of device interrogation (Figure 1), which shows that the atrial preference pacing (APP) feature was turned on with an internal decrement of 100 ms, which is nominally off. This feature was designed to suppress atrial arrhythmia, but in this case, interrogation of electrograms revealed that high atrial rate episodes as a consequence of APP were causing palpitation at rest and exercise (EGM1 and EGM2; Figure 2).

Atrial tachycardia is not a life-threatening arrhythmia and usually patients present with symptoms such as shortness of breath and palpitation, etc. In patients with permanent pacemakers, some studies have shown that atrial pacing reduces the incidence of atrial tachyarrhythmias.1-3 It has been described that an increased number of premature atrial contractions, by causing a dispersion of atrial refractoriness and conduction velocities, may play a role in initiation of atrial tachyarrhythmias.1-7 The APP algorithm developed by Medtronic Inc. (Minneapolis, MN, USA) allows the pacemaker to maintain the pacing rates slightly higher than the sinus rates and was designed to achieve a high percentage of atrial pacing to prevent atrial ectopic activity and premature atrial contractions. Several studies have assessed the efficacy of the APP algorithm but did not reveal consistent results and in some patients, APP activation is associated with a reduction in atrial tachyarrhythmias, but not in others not.8,9 In another study, APP off with APP on...
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Figure 2 EGM1. During searching period device detected a PAC at CL of 732 msec and initiate APP.

with three different search interval settings was compared and demonstrated that APP search interval setting should be tailored to the individual to obtain the greatest benefit from the algorithm to suppress atrial tachyarrhythmias instead of using nominal numbers. A case report also showed the onset of a life-threatening monomorphic ventricular tachycardia due to the APP algorithm. In our case, high atrial rate episodes, APP, as a consequence of APP were causing palpitation at rest and exercise intolerance. Symptoms were resolved by turning the APP algorithm off.

Figure 3 EGM2 after P wave amplitude test device detected a PAC at CL of 752 ms and initiate APP.
Conclusion

APP algorithm is a promising method for preventing atrial tachyarrhythmia in patients with an implanted pacemaker. However, instead of using nominal search interval settings, which may not benefit patients, we should individually tailor the programming, identifying the most effective search interval and also be aware of any possible pro-arrhythmic effects such as, high atrial rates, life-threatening arrhythmia ventricular arrhythmias, etc.

Conflicts of interest

The author has no conflicts of interest to declare.

References