Dizzy Spells in a Patient with Hypertrophic Obstructive Cardiomyopathy and a Pacemaker

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Abstract Pacemaker syndrome represents the clinical consequences of the haemodynamic adverse effects of atrio-ventricular asynchrony during pacing. Patients suffering from hypertrophic cardiomyopathy may be particularly sensitive to these effects because of the importance of atrial systolic contribution to left ventricular diastolic filling. In this case report, we describe the symptoms and cause of pacemaker syndrome in a patient with hypertrophic obstructive cardiomyopathy.

Keywords Pacemaker syndrome · Hypertrophic cardiomyopathy · Far-field R wave

In a 39-year-old male with a familial hypertrophic obstructive cardiomyopathy, a DDDR pacemaker (PM) was implanted because of symptomatic sinoatrial block. After implant a short AV interval was programmed to ensure ventricular (apical) pacing. During ventricular pacing, the outflow obstruction was reduced and atrial pacing allowed for treatment with β -blockers. During PM follow-up, the patient complained of dizzy spells of short duration. Pacemaker memory tracings during the dizzy spells were obtained and are depicted in Fig. 1. The tracings revealed inappropriate mode switch caused

by sensing the sinus node activity, atrial-paced complexes and the far-field R wave (FFRW) of the paced ventricular depolarisation.

During trial pacing in VVI mode, the patient recognised the symptoms of AV dissociation as the dizzy spells he experienced before. To exclude an increase of outflow obstruction during VVI pacing as a cause of the drop in blood pressure, registration of the left ventricular outflow obstruction during DDD and VVI pacing was evaluated. The outflow obstruction did not change during VVI pacing.

We concluded that an inappropriate mode switch due to FFRW sensing was the cause of the patient's pacemaker syndrome. After reprogramming atrial sensitivity to a less-sensitive setting, the FFRW was no longer recognised by the atrial sense channel, and symptoms were alleviated. Programming the automatic mode switch to the DDI mode would have been an alternative approach to preserve AV synchrony.

Pacemaker syndrome represents the clinical consequences of suboptimal AV synchrony or AV asynchrony, regardless of pacing mode. It is an iatrogenic disease that is often underdiagnosed [1]. The symptoms of the syndrome are related to the adverse haemodynamic and electrophysiological consequences of (temporary) ventricular pacing in the absence of other causes. Patients with decreased left ventricular compliance may be particularly sensitive to the loss of synchronised atrial activity [2]. In hypertrophic cardiomyopathy (HCM), impaired relaxation is an important cause of diastolic dysfunction. Impaired relaxation in HCM results in a reduced rate and volume of filling during the rapid filling period of diastole, with a resultant compensatory increase in atrial systolic filling.

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Fig. 1 Auto mode switch caused by non-sensed FFRW. At the time of this registration, the patient complained of dizzy spells. The *top line* of this pacemaker memory-derived intracardiac registration shows the pacemaker interpretation of the rhythm. *A*, atrial pace; *V*, ventricular pace; *P*, atrial sensed event; *P* in black box, atrial event sensed in the post ventricular atrial refractory period (PVARP). The *bottom line* of the tracing shows the atrial electrogram as derived from the atrial bipolar electrode. The pacemaker engages an automated mode switch (AMS), when the atrial frequency is higher than the atrial tachycardia

detection rate during about 5 to 8 s. As the atrial-paced events and all atrial-sensed events, including those during the PVARP, are utilised in the atrial rate counters, this pacemaker detects an atrial rate over the programmed atrial tachycardia detection rate (ATDR) and engages an automated mode switch to VVI. The detection of atrial events, however, includes the detection of the FFRW by the atrial event counter. This double count of atrial-paced and one sensed event and FFRW sensing is the cause of this inappropriate mode switch to the VVI mode

The loss of atrial systolic filling seen in patients with HCM and atrial fibrillation results in severe haemodynamic deterioration because of the importance of atrial systole in the presence of impaired relaxation [3]. The loss of atrial systolic contribution to left ventricular diastolic filling due to AV asynchrony is likely to be of similar haemodynamic importance. In our patient, the dizzy spells can be attributed to the adverse haemodynamic effects caused by pacemaker syndrome, worsened by HCM.

References

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