Atrial pacing for rhythm control of atrial fibrillation

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After atrial fibrillation (AF) develops, the first step is to search for and treat underlying (heart) diseases. Thereafter, AF should be treated. This includes prevention of cardiovascular morbidity and mortality, especially vascular events, and reduction of symptoms.¹ The latter may be obtained by two treatment strategies: rhythm-control and/or rate-control treatment. Recent randomised trials have shown that rate control is not inferior to rhythm control with regard to cardiovascular morbidity and mortality.² In these studies, predominantly elderly patients with underlying heart diseases (especially hypertension) were included. Patients with (severely) symptomatic AF and advanced heart failure were excluded. Since then, rate-control treatment has been adopted more frequently, even as first-choice therapy, especially in the elderly.

Rhythm control, however, remains indicated in patients who are symptomatic with the arrhythmia. The Achilles' heel in the rhythm-control management of AF is that recurrences frequently occur. Nowadays, efficacy of catheter ablation of AF is increasing and this treatment strategy is gaining popularity rapidly, especially in younger patients with paroxysmal AF. Atrial pacing is another non-pharmacological option to prevent AF.

In a subset of patients paroxysmal AF develops in the setting of a sick sinus syndrome. These patients need atrial pacing. Studies have demonstrated that the use of atrial-based pacing compared with ventricular pacing significantly lowers the incidence of AF but does not improve survival nor heart failure or cardio-

vascular death.³ While atrial pacing is effective in preventing development of AF in patients with symptomatic bradycardia, its value as a treatment for paroxysmal AF in patients *without* conventional indications for pacing has not been proved.¹ Novel pacemakers have several special algorithms implemented in order to prevent AF even more successfully, and are capable of measuring the AF burden.⁴ Prospective studies using these algorithms have yielded mixed results in patients with and without pacing indications. Some showed a reduction in AF burden, but the absolute difference was small. There was no gain in terms of quality of life, as well as mean number of AF episodes, hospitalisations, or mean duration of AF detected by the pacemaker's automatic mode switching algorithm.^{5,6} Others have failed to show any benefit of atrial pacing in preventing AF.^{7,8}

Why should atrial-based pacing be effective in preventing AF? It may prevent bradycardia-induced dispersion of repolarisation and it may suppress triggers such as atrial premature beats. In addition, by maintaining AV synchrony, retrograde ventriculoatrial conduction is prevented that can cause valvular regurgitation and stretch-induced changes in atrial electrophysiology. Furthermore, as septal pacing seems most effective, shortening of total atrial conduction time and reduction of dispersion of atrial refractoriness and conduction velocity, i.e. modification of the substrate, may be essential.

In this issue of the *Netherlands Heart Journal* De Voogt and Van Hemel question whether reliable detection and diagnosis of atrial tachyarrhythmias is actually achievable with the current pacemaker algorithms and leads.⁹ They nicely elucidate the presence of significant technical pitfalls that weaken the accuracy of the diagnosis of atrial tachyarrhythmias by these pacemakers at present. These limitations include 1) inappropriate sensing of AF due to variable and low voltage signals during AF, which may cause inappropriate detection of start and/or perpetuation of AF and other atrial arrhythmias; 2) far-field R wave sensing which may be prevented by adaptation of other pacemaker parameters which, in turn, may not only obscure far-field R wave sensing but also every second

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beat of an atrial tachycardia; and 3) insufficient memory capacity of the pacemaker to store all atrial arrhythmia episodes. They state that 'major improvement in pacemaker diagnostics is mandatory before pace intervention in atrial arrhythmias can be put to the test in large-scale trials.'

We agree and also recognise these shortcomings. To prevent AF by pacing, first of all, AF should be accurately diagnosed. Only then can pace intervention adequately be judged for its efficacy. Alternatively, diagnostic tools may be used to detect asymptomatic AF, e.g. possibly of importance for the assessment of the risk of stroke.¹⁰ Though technical pitfalls are certainly present, as the authors state themselves, the total duration of AF burden measured with a pacemaker seems highly reliable.^{11,12} Certainly, improvement in technical features will further enhance the accurate use of these diagnostic tools. But is it worthwhile to put every effort into improving this technology in order to use it for rhythm control for AF, also in patients without a pacing indication? Will there be a role for primary therapy for prevention of recurrent AF? The efficacy of atrial-based pacing in patients with a sick sinus syndrome probably just relates to prevention of bradycardias. It remains to be proven if additional pacing features have supplementary efficacy and whether these will ever play a role in patients without conventional pacing indications. ■

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