



## EDITORIAL COMMENT

## Pace and ablate: The ultimate treatment for atrial fibrillation?

### *Pace e ablação: o tratamento derradeiro para a fibrilhação auricular?*

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Atrial fibrillation (AF) has become a major epidemic and is associated with high morbidity and mortality.

Pacemaker treatment combined with atrioventricular (AV) node ablation is an effective treatment in patients with atrial arrhythmias and symptoms due to high ventricular rate refractory to pharmacological treatment.<sup>1</sup>

Another group that benefits from AV node ablation is patients with heart failure (HF), AF and cardiac resynchronization therapy (CRT) with a low percentage of biventricular pacing. AV node ablation has been shown to increase the percentage of biventricular pacing and thus enhance the therapeutic effects of CRT.<sup>2</sup>

However, AV node ablation is not without risks. Right ventricular pacing induces left ventricular dyssynchrony, which in turn impairs cardiac function. There is also an increased risk of sudden death after AV node ablation.<sup>3</sup> In addition, the long-term performance of pacing devices is not flawless.<sup>4</sup> Hence the relevance of long-term results after a pace-and-ablate strategy.

The article by Manuel et al. in this issue of the *Journal*<sup>5</sup> describes the retrospective experience of a Portuguese tertiary center with the longest follow-up ever published after AV node ablation. The authors followed a highly varied population of 123 patients who had undergone AV node ablation for a median of 8.5 years (8.8–11.8). Most of the patients presented uncontrolled supraventricular tachycardia that resulted in HF, tachycardiomyopathy, inappropriate implantable cardioverter-defibrillator (ICD)

shocks and other severe symptoms related to tachycardia. Ten (8%) patients were treated due to low biventricular pacing percentage.

The most common arrhythmia was AF (65%). All AV node ablation procedures were successful and there were no major complications. Thirteen (11%) patients had previously implanted devices and all the others were implanted at the time of AV node ablation. The final distribution of devices was 90 pacemakers (82%), seven CRT pacemakers (6%), nine CRT defibrillators (8%) and four ICDs (4%).

Unexpectedly, there were no device-related complications during this long follow-up.

The authors report improvements in HF functional class and fewer hospitalizations and unplanned emergency department visits due to HF. There were no differences in left ventricular ejection fraction (LVEF) or left ventricular end-diastolic diameter before and after the procedure. The authors do not clarify the timeframe of these clinical and echocardiographic changes. For this reason, the magnitude and pattern of benefits cannot be fully elucidated.

At the end of the follow-up mortality was 23%. There is no information regarding causes of death.

Despite these gaps, this article highlights the importance of AV node ablation.

In a meta-analysis of randomized trials comparing pace-and-ablate with drug therapy, overall mortality at one year was 3.5% in the pace-and-ablate group,<sup>6</sup> similar to the findings of Manuel et al.<sup>5</sup> It should be borne in mind that no robust data support survival benefit after a pace-and-ablate strategy.

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Elucidation of the causes of death is of paramount importance. AV node ablation is associated with a small (2-4%) risk of sudden death.<sup>7</sup> It is important to note that the vast majority of those who experience sudden cardiac death had a significant number of risk factors, including reduced left ventricular function, advanced HF, and a history of ventricular arrhythmias.

Programming the pacemaker at higher ventricular pacing rates (minimum 90 bpm) for the first 1-2 months following ablation has been a way to mitigate the risk of proarrhythmic bradycardia, which can result in sudden death, but pacemaker dysfunction is another possible cause of sudden death. With this concern in mind, many centers postpone AV node ablation until pacemaker electronics are reassessed. Alternatively, a simultaneous procedure like that of Manuel et al.<sup>5</sup> would be less burdensome. The vascular access for the ablation catheter could even be the same as for the pacemaker. By not reporting causes of death, the present article fails to clarify this important issue.

The assessment of symptoms, improvement in ventricular function and reduction in hospitalizations and emergency department visits is a matter of debate. Most studies, including that by Manuel et al., included patients with and without reduced LVEF. Patients with reduced LVEF could be expected to improve due to reversal of tachycardiomyopathy or increased biventricular pacing percentage. On the other hand, patients without reduced LVEF could worsen because of pacing-induced dyssynchrony. Some patients could improve by one mechanism and worsen by the other and the final outcome would be difficult to predict.

In general, several retrospective studies, randomized controlled trials, and meta-analyses have reported positive evidence that pace-and-ablate is a valuable palliative therapy for highly symptomatic, drug-refractory AF patients. Many retrospective studies have documented significant acute and long-term improvement in left ventricular function, symptoms, cardiac performance, exercise tolerance, clinical outcomes, and quality of life.

There have been several randomized controlled trials comparing a pace-and-ablate strategy with medical therapy. Pace-and-ablate was effective in controlling symptoms and improving quality of life but showed no benefit regarding death or left ventricular function.

Some meta-analyses have reported improvements in patients with symptomatic, drug-refractory AF. Wood et al.<sup>8</sup> found that exercise duration, LVEF, quality of life, symptoms, and hospital admissions improved significantly. Chatterjee et al.<sup>9</sup> found in their meta-analysis that in the therapeutic management of refractory AF, AV node ablation was associated with improvement in symptoms and quality of life. In addition, patients with reduced LVEF demonstrated an improved echocardiographic outcome compared to medical therapy alone. However, there was no survival advantage.

For the subgroup of patients with CRT and low pacing percentage the benefit is beyond doubt.<sup>10</sup>

The debate on the effects of AV node ablation on left ventricular function and clinical outcomes of HF is ongoing and reports of these effects are not consistent.

Meanwhile, in order to avoid the deleterious effects of long-term right ventricular pacing on left ventricular function, biventricular pacing has been proposed as an alter-

native to right ventricular pacing. CRT significantly reduces hospitalizations for HF and significantly improves functional capacity and left ventricular function, volumes and diameter in comparison with right ventricular pacing.<sup>11</sup> The PAVE study<sup>12</sup> randomized 184 patients with a mean LVEF of 46% to biventricular pacing or right ventricular pacing following AV node ablation. Both groups showed an improvement in 6-min walk distance compared with baseline. Of interest, the two pacing modalities did not differ until six months after the procedure, when a slight deterioration in the right ventricular pacing group resulted in a significant difference between the two groups. The right ventricular pacing group showed a significant fall in LVEF within six weeks which persisted at six months. On the other hand, LVEF in the biventricular pacing group did not change from baseline values. Patients with impaired LVEF at baseline who underwent biventricular pacing showed the greatest improvement. Furthermore, patients with New York Heart Association class II or III heart failure who received biventricular pacing improved significantly more than those who received right ventricular pacing.

The current guidelines give CRT a class IIa recommendation, level of evidence B, for patients with AF and left ventricular dysfunction who are candidates for AV node ablation.<sup>13</sup>

Huang et al.<sup>14</sup> demonstrated that permanent His bundle pacing is safe and stable in HF patients with AF who had narrow QRS and underwent AV node ablation. They observed a significant improvement in functional class and echocardiographic LVEF and reduced use of diuretics in HF therapeutic management. Current results make His bundle pacing an attractive pacing modality before AV node ablation, preserving ventricular synchrony.

Patients with AV node ablation become chronotropically incompetent. This condition may be corrected by rate-adaptive pacing. While rate-responsive pacing can help these patients to adapt during exercise, it can also elicit an excessive increase in heart rate with possible deleterious effects. Device programming should be meticulous.

A less radical alternative to AV node ablation is AV node modulation. Although the results are less predictable, it avoids the need for a pacemaker and can be thought of as a step between drugs and AV node ablation.<sup>15</sup>

Ablate-and-pace is a useful and easy therapy but should be regarded as a last resort. It makes patients pacemaker-dependent and thereafter prone to pacing-induced dyssynchrony, pacemaker dysfunction and infection. Although the markers for a worse prognosis after ablate-and-pace are not completely elucidated, care must be taken when choosing the pacing device, particularly in patients with impaired systolic function and HF. For these patients a more physiological pacing modality, like biventricular pacing or His bundle pacing, should be considered.

## Conflicts of interest

The author has no conflicts of interest to declare.

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