Ablate and pace: a pragmatic approach to paroxysmal atrial fibrillation not controlled by antiarrhythmic drugs

AV junction ablation (producing AV block) followed by implantation of a pacemaker is a well established, generally accepted treatment for patients with paroxysmal atrial fibrillation (PAF) not controlled by antiarrhythmic drugs. In expert hands, the efficacy of producing complete AV block is usually > 95% if a sequential right and left side approach is used; regression of AV block late after ablation (which requires a second procedure on a different day) occurs in fewer than 5% of cases.1-4 There have been only a few small studies, but ablate and pace treatment seems to be highly effective and superior to drug treatment in controlling symptoms of the arrhythmia and improving overall quality of life.5-7 In this respect, the study of Marshall et al in this issue provides further evidence of the beneficial effect of this treatment. In particular, using validated instruments for outcome measurements in pacemaker recipients, the authors found a pronounced decrease in the magnitude of specific symptoms of arrhythmia and an improvement in physical, socioeconomic, and psychological aspects of quality of life. Nevertheless ablate and pace treatment is palliative. Indeed, in contrast to other ablative procedures—that is, those used for the treatment of AV nodal reentrant tachycardia and accessory bypass tracts, in which the ablation can be considered curative—AV junction ablation is unable to eliminate the electrophysiological substrate of the disease and works only indirectly through the control of irregular and fast ventricular rate. In other words, an old disease (uncontrolled PAF) is replaced by another disease (iatrogenic AV block and pacemaker dependency). Moreover, the procedure is necessarily associated with a pacemaker implant and there are small but definite risks of short and long term complications. For these reasons, many cardiologists and electrophysiologists have concerns about the wide use of this new treatment, and some refute the wisdom of its introduction into clinical practice. It must be remembered that the typical candidate for ablate and pace is an old patient who has frequent (even daily) episodes of symptomatic PAF; he or she is very distressed by the arrhythmia, which greatly limits quality of life; he or she has been treated unsuccessfully for many years with many drugs. Apart from atrial fibrillation, frequently no structural heart disease is found (in 75% of cases in Marshall et al’s study) suggesting that rapid and irregular rhythm are the most likely factors contributing to symptomatology. What should we do for these patients when drugs fail? Theoretically, other non-pharmacological treatments that aim to preserve or restore sinus rhythm should be preferred; these may include atrial pacing (single or multisite), endocardial ablation of AF foci, and atrial defibrillators. Nevertheless, their role is yet to be fully defined,8 and without further clinical evaluation they are still to be considered investigational. Thus, at present, a pragmatic approach is advisable, weighing the great clinical benefit of ablate and pace treatment in reducing symptomatology against the risk of complications and side effects. Moreover, advantages and disadvantages of this treatment should be compared with those of other non-pharmacological treatments of atrial fibrillation to offer each patient the best available treatment.

Who are the ideal candidates for ablate and pace treatment?

Pharmacological treatment remains the initial treatment of choice in patients with PAF. Therapeutic strategies should include efforts to restore and conserve sinus rhythm and to control ventricular rate during paroxysms. Alternative non-pharmacological treatment, including AV junction ablation and pacing, can be proposed in patients for PAF not controlled with antiarrhythmic drugs. Antiarrhythmic drugs are considered ineffective not only when PAF recurs despite the best treatment, but also when the recurrences are so frequent or cause such severe symptoms that quality of life is greatly impaired. Alternatively, patients may be exposed to a risk of life threatening complications, such as syncope, cardiac arrest or acute heart failure. Ablate and pace treatment is also generally accepted in patients with the bradyarrhythmia-tachycardia syndrome who are already treated with a pacemaker. Finally, ablate and pace may be indicated as an alternative to drugs when there is risk of severe side effects or the drugs are not tolerated.

The indication to ablate and pace in persistent atrial fibrillation (episodes requiring medical intervention for termination), is less clear, because efforts must be made to restore and maintain sinus rhythm. Ablate and pace is contraindicated when there is evidence of an electrophysiological substrate amenable to a curative procedure (for example, focal atrial fibrillation, atrial fibrillation associated with AV accessory pathway, atrial flutter, and AV nodal reentrant tachycardia).

How many potential candidates are there for ablate and pace?

Atrial fibrillation is by far the most frequent arrhythmia. It has been calculated that it is present in 1.6–2% of the general population. It is particularly frequent in the elderly, in men, and in patients with heart disease; the prevalence of atrial fibrillation approaches 10% in men and women over age 65 with cardiovascular disease.10-11 Thus, one could estimate that in Europe at least 8.2 million (out of a total population of 513 million) people are affected by atrial fibrillation. About 40% of cases are paroxysmal and 12% are considered intractable despite multiple drug treatment.12 Therefore, we can calculate that in Europe about 396 000 patients (216 000 older than 65) are affected by PAF that will not be controlled by drugs. Given this high prevalence, its treatment has socioeconomic and organisational implications that go beyond the remit of the electrophysiologist.
patients initially treated with DDD pacemaker required ventricular tracking of rapid atrial rhythm, and some to dual chamber pacing because of the risk of tachyarrhythmias was considered a relative contraindication. If this were to occur, ablate and pace would be available to without remaining confined to specialised tertiary centres.

Figure 1 Examples of functioning of two different mode switching algorithms. (A) Response of a fast mode switching device (Diamond DR) to atrial tachyarrhythmia. The second and third complexes from the left are sinus beats with ventricular tracking; this is followed by atrial tachyarrhythmia and immediate mode switching (complex 4); two beats of sinus rhythm (complex 5 and 6) follow with immediate resynchronization and tracking of P waves; longer run of atrial tachyarrhythmia with immediate mode switching (complexes 7 and 8). (B) Response to atrial tachyarrhythmia of a slow mode switching device (Triology DR+). The second and third ECG complexes from the left are sinus beats with ventricular tracking at a rate of 65 beats/min. These are followed by a short run of atrial tachyarrhythmia that is tracked at a rate of 125 beats/min. The tachyarrhythmia terminates before mode switching occurs. (Reprinted with permission from Kamalvand et al.)

Ablate and pace treatment is relatively simple and safe to perform, with a very small number of complications; it is relatively inexpensive and it can be performed easily in most electrophysiology laboratories with only minor technological improvements. In Western countries at least, this new treatment has the potential to become widely diffused, without remaining confined to specialised tertiary centres. If this were to occur, ablate and pace would be available to a much larger proportion of potential candidates and be considered a conventional non-pharmacological treatment.

Which mode of pacing?

Only a few years ago, the presence of paroxysmal atrial tachyarrhythmias was considered a relative contraindication to dual chamber pacing because of the risk of ventricular tracking of rapid atrial rhythm, and some patients initially treated with DDD pacemaker required downgrading to VVI mode. In Marshall et al’s study, all patients received a dual chamber pacemaker with a mode switching algorithm. This change in opinion in the choice of pacing modality was justified by a major advance in technology of dual chamber pacemakers in recent years, namely the development of new sophisticated algorithms for recognition of pathological atrial rhythms and automatic change of pacing mode from DDDR to DDIR during an atrial tachyarrhythmia. Even though Marshall et al’s study does not specifically address the issue of which pacing mode to use after ablation, their decision to use DDDR mode switch pacing seems to be supported by a strong rationale and by studies from the literature in which different mode switching algorithms were compared with themselves and with standard DDDR and VVI pacing.

Indeed, in patients with PAF, AV junction ablation creates an iatrogenic effect only rarely found in patients without ablation—namely the simultaneous presence of total AV block and paroxysmal atrial tachyarrhythmias. DDDR mode is preferable to the VVI and DDD modes as, theoretically, it restores AV synchrony during sinus rhythm, prevents the development of atrial fibrillation, and provides adequate ventricular rate increase during physical activity in the presence of atrial tachyarrhythmias. To overcome ventricular tracking of rapid atrial activity, various mode switching algorithms have been developed that can change pacing modality automatically from an AV synchronous mode during sinus rhythm to a non-AV synchronous mode during atrial fibrillation. Therefore, the pacemakers must have an algorithm that is able to identify pathological atrial arrhythmias and to differentiate them from physiological variations in rate. Fast mode switching devices have been reported to be more effective than medium and slow mode switching devices (fig 1).

Different algorithms are available. In general, the more a system is able to minimise symptomatic changes in ventricular rate resulting from atrial arrhythmias the more efficacious it is in relieving symptoms. This is especially the case in patients undergoing AV junction ablation for PAF. Indeed, this particular population is characterised by a very low threshold for noticing irregular atrial rhythms; single premature beats are sometimes able to cause discomfort. The reason is unclear as they do not seem to differ from the larger population of patients affected by atrial fibrillation.

Failure of ablate and pace treatment

Contrary to the excellent results observed in most cases, ablate and pace treatment is clinically unsuccessful in a minority of patients. This occurred in 14% of the patients in the Italian study, and in 7% of cases of Kamalvand et al.’s study. Even though not specifically pointed out, this seemed to be the case in two of 18 patients in Marshall et al’s study who had a worsening of their symptoms after ablation. There are several possible explanations for this contrasting behaviour. A careful analysis of follow up records has sometimes suggested that atrial fibrillation recurrences were only partially responsible for the subjective perception of palpitations. It is quite possible that symptoms after ablation were related to DDDR pacing itself or to inappropriate programming, or to adverse haemodynamic effects of electrostimulation from the apex of the right ventricle. Moreover, Weber and colleagues found that a psychiatric illness is the cause in nearly one third of all patients with palpitations. It is possible that a depressive status (which is frequently associated) may decrease the threshold of subjective perception of non-physiological rhythms.

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STAMPS IN CARDIOLOGY

Antismoking campaigns

Stamps emphasising the health hazards of smoking have appeared as part of health and fitness (Tonga 1983, Australia 1990), antidrug/addiction campaigns (Belgium Red Cross stamps 1978), and the promotion of non-smoking days (Mexico 1990, Brunei 1994). The Japanese stamp commemorates the sixth international smoking and health conference held in Tokyo in 1987. Two contrasting designs are used—the pink complexion of the queen holding a bird and the blue complexion of the king smoking a cigarette. The stamp also illustrates the principle and value of a visual message rather than text in a specific language in promoting international health awareness. Perhaps the largest single issue of antismoking stamps was in April 1980 when the World Health Day theme was “Smoking or health, the choice is yours”. Cardiovascular and respiratory disease (particularly lung cancer) were some of the most prominent topics in these issues often incorporating some gruesome designs. The stamp from China illustrates both cardiac and respiratory health hazards of smoking as does the stamp from Portugal, which also shows an emaciated hand holding a cigarette.

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