Chronic atrial fibrillation — how to best reach a permanent sinus rhythm?

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Patients with permanent atrial fibrillation have an increased risk for, and suffer symptoms related to, cardiac irregularity and haemodynamic alterations associated with the arrhythmia. Although proper adjustment of ventricular rate and prophylaxis against thromboembolism may be equally preferable as a regimen, including repeated efforts at converting to sinus rhythm and preventing relapse to atrial fibrillation, the latter regimen is mostly advocated. Although several new non-pharmacological treatments have been developed and are applied with different degrees of success, the vast majority of patients are candidates for the traditional treatments only, namely antiarrhythmic drugs with or without direct-current cardioversion attempts.

This traditional treatment can be divided into three distinct phases, namely the treatment during atrial fibrillation before cardioversion, the actual cardioversion and the treatment to maintain the established sinus rhythm. In this issue, Capucci et al. report results of a comparison between different approaches of identical pre- and postcardioversion regimens[1]: treatment with amiodarone or diltiazem as well as immediate pre-cardioversion treatment with glucose–insulin–potassium in addition to diltiazem pre- and post-conversion.

In summary, the amiodarone regimen was superior to the other alternatives regarding spontaneous or electrical conversion to, and subsequent maintenance of, sinus rhythm. The result reached statistical significance in spite of a limited sample size. In addition to these results, the study clearly illustrates the need for further and more detailed exploration of optimal treatments at the three different phases of atrial fibrillation to sinus rhythm conversion.

The pre-cardioversion phase

In the present study, diltiazem was used in two groups for adjustment of ventricular rate during atrial fibrillation before cardioversion. As pointed out by the authors, this treatment may theoretically counteract the unfavourable rate-induced remodelling associated with long-lasting atrial fibrillation[2], thereby increasing the post-conversion likelihood of maintaining sinus rhythm. No conclusions on this possible beneficial effect can be drawn from the results of the present study, however. In fact, no clinical study has hitherto analysed this possible desirable effect of any calcium channel blocker in a prospective manner. Furthermore, no evaluation of the effect of diltiazem on remodelling-related variables exists whatsoever.

The treatment with glucose–insulin–potassium prior to cardioversion may counteract the undesirable shortening of atrial refractoriness in atrial fibrillation via another mechanism: reversion of atrial myocardial cellular potassium loss. Although this ionic deficiency has been verified in several studies in cases with long-term atrial fibrillation, a more careful analysis reveals that it is limited to patients with marked atrial enlargement and increased intraluminal pressure[3]. The present study revealed no benefit from this treatment but since such patients were excluded, this treatment may still be valuable in others.

An additional condition of the present study, the avoidance of digitalis prior to cardioversion, may influence the results. Thus, the atrial cellular effects of digitalis, mediated by acetylcholine via its vagomimetic effect, are complex and include both shortening of repolarization and hyperpolarization[4], representing both possible pro- and antiarrhythmic effects. The net result of these effects during the
The cardioversion phase

The routines of the cardioversion phase also differ widely and are based on traditions and beliefs even more than those of the pre-cardioversion phase. Firstly, a true evaluation of the relationship between the long-term success of pharmacological contra electrical cardioversion techniques is not available. Secondly, the optimal positioning of defibrillator electrodes has limited support from well designed and performed studies, a comment also valid for electrode-body impedance and the design of the defibrillation pulse. Thirdly, the choice of anaesthetic method may influence the outcome of the procedure, since these agents act differently on mechanisms of known pro- and antiarrhythmic action\(^5\).

Like most studies of modes of maintaining sinus rhythm after conversion from atrial fibrillation, Capucci et al. have standardized all components of this phase, using direct-current cardioversion with electrode positioning having theoretical advantages.

The post-cardioversion phase

Traditionally, this phase has attracted higher scientific interest than the preceding phases. Several studies have been conducted on the effects of the continuous use of different antiarrhythmic drugs, mostly up to one year. Based on today’s knowledge about the reversibility of rate-induced atrial myocardial remodelling\(^1\) and the relapse rate at different times following a successful cardioversion\(^6\), the post-cardioversion phase should be divided into two parts: the first one should comprise the initial 1–2 months of sinus rhythm.

Thus, irrespective of which prophylactic antiarrhythmic drug is given, this is the period during which most relapses to atrial fibrillation occur. In fact, a careful analysis of relapse rate during the period thereof in a number of different treatment groups of several randomized studies reveals a largely identical relative relapse rate of about 7% per year\(^6\). The commonly accepted routine advice, of continuous prophylactic antiarrhythmic treatment following a successful cardioversion can therefore be questioned. Whether short-term treatment following cardioversion is equal, or even superior to, continuous long-term treatment, taking all aspects of the treatment into account, needs to be analysed.

Concluding remarks

Capucci et al.\(^5\) have contributed to the knowledge on one of the most common cardiac disorders necessitating treatment: permanent atrial fibrillation. Today’s knowledge also implies that the traditional treatment of this condition perhaps has to be questioned. There is accumulating evidence that this condition should be treated as a priority in order to achieve the highest possible success. The optimal treatment for pro-fibrillatory remodelling is still unknown, but should involve a high degree of ‘spontaneous’ relapse to sinus rhythm, as achieved by amiodarone when used in the manner suggested by Capucci et al.

It is possible — even probable — that the success of different treatment modalities during the cardioversion and post-cardioversion phases may differ depending on the degree of reversion of the atrial myocardial remodelling. Therefore, effort should be made first to identify the optimal pre-cardioversion treatment. Not until this is done can the additional effects of various regimens during the cardioversion and post-cardioversion phases, respectively, be reliably explored.

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References