

AV nodal ablation in atrial fibrillation

A cardiologist's perspective on rate control in atrial fibrillation by I.W.P. Obel.

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decrease in life expectancy and an increase in morbidity due to systemic thromboembolism and association with cardiac failure through mechanisms not completely understood but almost certainly as a result of a rapid, irregular rhythm.⁽³⁾

The best and most widely accepted form of treatment for atrial fibrillation is to find and remove the cause. Regrettably this is usually not possible.

Current therapy of atrial fibrillation usually is traditionally divided into rhythm control (where the attempt is to restore and maintain sinus rhythm) and rate control. Anticoagulation therapy is of course essential but will not be commented on further here. Both of these strategies can be addressed by either pharmacological or non-pharmacological therapies.

Although the AFFIRM substudy⁽⁴⁾ in a predominantly elderly population demonstrated no clear advantage of either strategy, it was shown that no matter how sinus rhythm was obtained its presence imparted a better prognosis. However, a non-significant increase in mortality was noted in that group of patients receiving pharmacological therapy for rhythm control in terms of higher morbidity and mortality.⁽⁵⁾

The antiarrhythmic drugs utilized for rhythm control are known to have a low efficacy (the highest being with Amiodarone) seldom reaching 60% long-term control. Most are associated with potentially fatal proarrhythmia and Amiodarone with other serious or even fatal non-cardiac side effects, although a very low (but present) potential for proarrhythmia exists.

The drugs utilized for rate control are mainly beta blockers or calcium antagonists. Digitalis exerts its rate control properties via vagal stimulation and provides little or no rate control when parasympathetic stimulation is withdrawn. Thus rate control during exercise or with sympathetic stimulation (e.g. infection, exercise or heart failure) is poor. Neither beta blockade nor calcium antagonists, although widely utilized, can be safely given to all patients and often are inefficient.

ABSTRACT Atrial fibrillation has reached epidemic proportions and is associated with important increases in mortality and morbidity. This increased risk is most prominent in patients with heart failure.

Apart from anticoagulation, therapeutic approaches are: attempts (mainly pharmacological) at rhythm control (attainment and preservation of sinus rhythm) or rate control, which focuses on attaining an acceptable ventricular rate. The latter can be reliably and easily attained by ablation of the AV node and pacing. Long-term (up to 120 months) results of AV nodal ablation and pace are reviewed in 147 patients with NYHA Grade III or IV heart failure and atrial fibrillation and presented. This analysis indicates that AV node ablation is an effective form of therapy since prognosis after AV node ablation relates entirely to the underlying illness and not the atrial fibrillation. SAHeart 2008; 5:171-173

Atrial fibrillation has been called the modern epidemic in cardiology by Dr E Braunwald (Shattuck Lecture).⁽¹⁾ The actual incidence is apparently steadily increasing particularly in the ever-expanding elderly population. At least 9% of octogenarians suffer from atrial fibrillation.⁽²⁾ This slowly increasing prevalence with age strongly suggests an ongoing pathogenic mechanism. The presence of atrial fibrillation is associated with a

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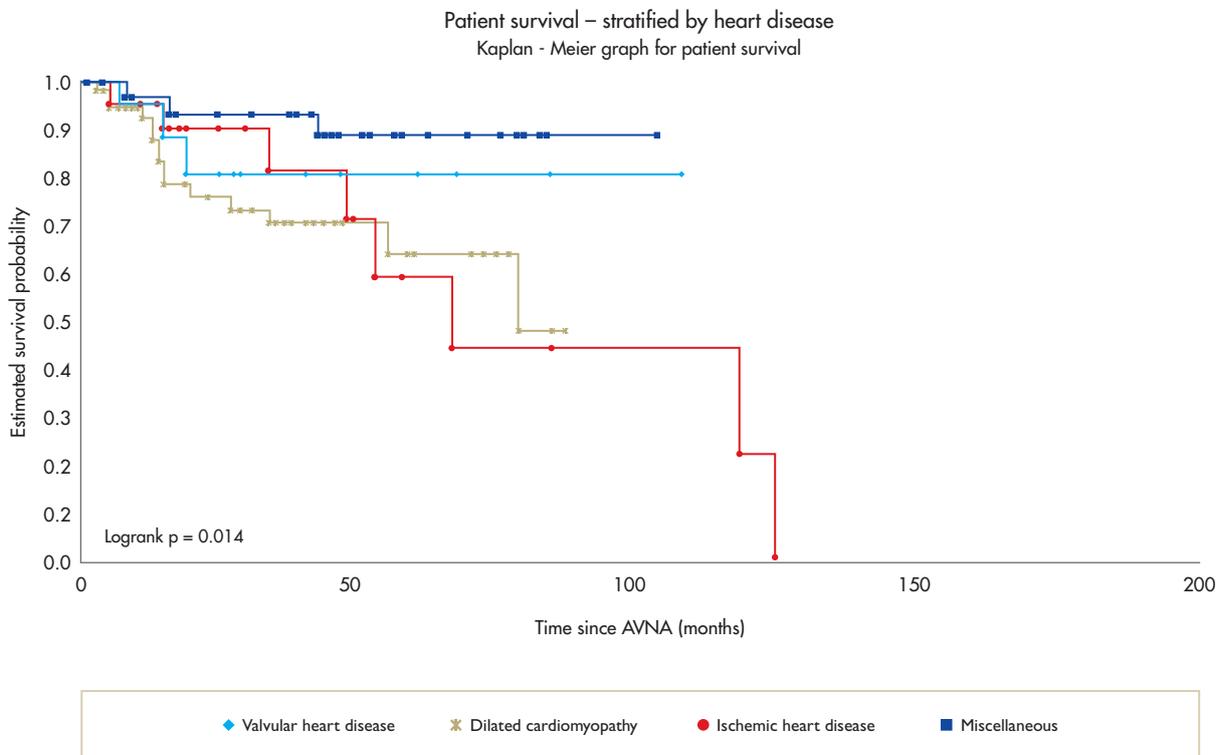
Non-pharmacological treatments for the “curative” ablation of atrial fibrillation mainly take place in the left atrium and find their major application in young and middle-aged patients with paroxysmal atrial fibrillation although some success can be obtained by ablation therapy of the persistent variety. For chronic atrial fibrillation the results are considerably worse and patients are more likely to have an early relapse. It is difficult to envisage long-term success in the elderly, particularly in the light of what seems to be an ongoing pathological process.

The use of the pacing techniques, mainly atrial based, are now known to have value only in those patients with very low sinus rates. Ventricular pacing has been used in the past to guarantee a safe ventricular rate when using high doses of calcium blockers or beta blockers to obtain control of rapid but unstable ventricular response. This approach is rarely satisfactory, usually because of inefficiency but frequently as a result of unacceptable drug side effects following the high doses required to obtain adequate rate control.

In 1982, independently, Gallagher and Scheinman explored ablation of the AV node by physical means combined with ventricular pacing for the treatment of drug resistant supra-ventricular arrhythmias, mainly atrial fibrillation. There is a natural reluctance in destroying a normally functioning AV node and “condemn” the patient to a life of pacemaker dependence. At one time attempts were made to ablate only part of the AV node, the slow pathway, which has a much lower refractory period and thus facilitates the conduction of more impulses per minute. This approach, which aimed at controlled AV conduction (thus obviating the need for permanent ventricular pacing), was however unreliable and relatively inefficient and is no longer used.

Experience over the years has shown AV nodal ablation with ventricular pacing to be highly reliable, extremely well accepted by most patients and easily performed. The procedure is easily applied to most patients, including those of advanced age (a great advantage when reviewing the demography of atrial fibrillation).

FIGURE 1: Survival curve (150 months) following AV node ablation and predominantly right ventricular pacing (33 biventricular) in 147 patients Grade III and IV heart failure.



Survival is basically related to the underlying cardiac illness. The cause of death in the ischemic group followed further coronary events. The group with cardiomyopathy was intermediate between ischemic and other non-ischemic causes. For other patients with heart failure and uncontrollable atrial fibrillation survival post AV nodal ablation matched normal patients' age and sex.⁽⁸⁾

Further doubt as to the value of therapeutic efforts to ensure sinus rhythm by pharmacological methods have recently increased.^(6,7)

In spite of the reluctance to destroy a normal functioning AV node, the difficulty of attaining drug mediated rate control has resulted in fairly wide utilization of this technique. Initially a wide variety of patients with a variety of supra-ventricular arrhythmias were so treated, including paroxysmal atrial fibrillation, typical atrial flutter and others, which can now be effectively treated or even cured with other methods of radiofrequency ablation. AV node ablation in these patients is totally unacceptable.

The association between heart failure and chronic atrial fibrillation is complex. Briefly, atrial fibrillation may aggravate, complicate or even cause heart failure. What is clear, however, is that rapid atrial fibrillation that does not come under control with conventional heart failure therapy is associated with a very poor prognosis – particularly in patients with NYHA grades III or IV disability. Attempts at rhythm control in chronic cases often fail or may cause significant deterioration in the patient's condition. In these circumstances an urgent "ablate and pace" strategy is frequently dramatic in relief brought to such patients. It may indeed be life saving.⁽⁶⁾

The relationship between "ablate and pace" and heart failure is also complex. We have recently learned that right ventricular apical pacing may cause deterioration in the patient's hemodynamic state by inducing left bundle branch block type dyssynchrony in some patients. Such patients respond well to bi-ventricular pacing. It is currently not possible to predict which patients will require bi-ventricular pacing ab initio and the need may only manifest some time after the initial "pace and ablate" strategy has been employed. Thus, upgrade to biventricular pacing can be electively done at a later stage, often when the initial crisis has passed. The extent to which right ventricular septal, para-Hisian or even His bundle pacing will alleviate the problem is not yet clear:

"Pace and ablate" in correctly chosen patients (usually a clinical decision based on the inability to control rapid ventricular response in a chronic setting) and often associated with heart failure is associated with an increased quality of life, loss of the symptoms of palpitations or drug side effects and probably an improved life expectancy (see Figure 1). The technique is often valuable in the setting of bi-ventricular pacing

where atrial fibrillation overrides the paced rhythm, which can then have little benefit. It is a simple technique to learn and, in the author's view, is often the treatment of choice for poorly controlled chronic atrial fibrillation, particularly in the aged.

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