

Letters to Editor

Journal of Atrial Fibrillation



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Why Should We Not Delay Ablation in New Onset Recurrent Atrial Fibrillation

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Abstract

Recurrent episodes of atrial fibrillation are associated with progressive left atrial substrate remodelling over time. We present an argument for early ablation in the treatment of recurrent paroxysmal atrial fibrillation prior to such deleterious changes in "left atrial electrical health"

Introduction

A recent comprehensive review of atrial fibrillation (AF) has proposed new clinical concepts.1 However, early intervention with ablation techniques was not considered. We believe that there is now sufficient evidence to offer ablation therapy very soon after the first clinical presentations of paroxysmal AF as first line treatment. We present a simple argument which we believe is convincing. AF is currently classified as "paroxysmal" or spontaneously terminating within 7 days, or "persistent" lasting for over 7 days or requiring cardioversion to restore sinus rhythm; or "longstanding persistent" meaning present without pause for over one year; or lastly, "permanent" AF when it is accepted by the physician and the patient that no attempts should be made to convert the AF back to sinus rhythm.

It is well known that that duration of uninterrupted AF has important complex biochemical and physiological effects on the myocardium of the left atrium, otherwise known as negative electrical remodelling. This has been succinctly described as

"atrial fibrillation begets atrial fibrillation".² In essence the "health" of the left atrium deteriorates the longer the duration of the AF. The evidence strongly suggests that patients with paroxysmal AF may, if untreated, develop more frequent and more prolonged episodes such that they develop "persistent atrial fibrillation" either as a result of duration in excess of 7 days or by requiring cardioversion. Once reclassified there is no reverting to a lesser category. The six new categories proposed,¹ reflect the progressive severity of atrial negative remodelling. The evidence indicates that each category from "pre" to "permanent" is incrementally more difficult to treat whether using drugs for suppression in paroxysmal atrial fibrillation (PAF), rate control in permanent atrial fibrillation or increasingly complex modes of left atrial ablation in attempts to eliminate the substrate (the left atrial myocardium).

Atrial electrical remodelling is a complex biochemical and physiological process which has been well studied in animals3 and humans.⁴ It is manifest by changes in the microstructure of the atrium with increase in fibrosis, electrical changes

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including shortening of action potential duration and refractory period, slowing of conduction as a result of alterations in sodium, calcium and potassium channel functions and many other effects.³ Here we will refer collectively to these processes as deleterious changes in "left atrial electrical health".

For paroxysmal AF there is little doubt that pulmonary vein isolation (PVI) by any technique is successful in the majority of patients.⁵ It is also the simplest approach and is central to almost all methods of ablation of AF. A variety of adjunctive strategies have been described for paroxysmal and persistent AF. Pappone et al,⁶ developed wide circumferential atrial ablation which aims to both isolate the veins and modify the atrial myocardium. Haïssaguerre et al,⁷ have devised a stepwise approach by adding linear ablation to conventional electrophysiological PVI. Nademanee's group,8 targeted so-called "continuous fractionated atrial electrograms" or CFAEs. Others such as Pokushalov et al,9 have advocated specific targeting of autonomic ganglia located in clusters on the posterior left atrial wall. None of these techniques has proved superior to another and none is as effective as simple PVI for the treatment of paroxysmal AF.9,10 The success rate of ablation for persistent AF is much less than for paroxysmal AF even with several procedures.7 The implication of these observations is clear: interventional treatment with ablation should be offered as first line treatment in those patients who present with more than one episode of paroxysmal AF.

A Graphical Representation of Left Atrial Health

We recognise that AF is a heterogeneous disease, with a spectrum of left atrial substrates dependent upon underlying aetiologies. Nonetheless we present a hypothetical graph of the natural history of AF in a single patient (figure 1). Immediately after the first onset of AF (red line at point a) negative atrial remodelling or deterioration in "left atrial electrical health" begins (y axis) and continues as long as AF is present (arbitrary time scale on x axis). When sinus rhythm is resumed either spontaneously (point b) or by cardioversion (points c and e) positive remodelling or an improvement of left atrial health occurs as a result of gradual reversal of the adverse effects of negative remodelling (point f). The longer the duration of preceding AF the longer the recovery time (blue lines). This may be interrupted by a further recurrence of AF (point d).

If it is accepted that the diagram fairly reflects the natural history of atrial fibrillation and "left atrial health" the implications are clear: atrial fibrillation should be treated as early as possible in its natural history. There is unanimity in the international atrial fibrillation/electrophysiology community that a single attack of AF may be just that – a one off

Figure 1: Hypothetical Natural History of Atrial Fibrillation Over Time



Hypothetical natural history of atrial fibrillation over time

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episode that requires simple investigation (for example an echo, an ECG monitor) but no treatment other than perhaps avoidance of precipitating factors. For patients who have recurrent AF defined as 2 or more spontaneously terminating episodes PVI should be considered at an early stage, possibly as first line treatment.10 New techniques such as cryoballoon PVI are very promising.¹¹

There are financial implications in providing early intervention in the course of atrial fibrillation, with the cost associated with increased numbers of ablation procedures. However, the initial cost of the ablation procedure may be less than that of medical management of AF in the long-term, which includes the costs of anti-arrhythmic medication, out-patient clinic attendances and most importantly hospital admissions.¹² Furthermore, the prevention of persistent AF by intervention early in the course of the disease may reduce the costs associated with the treatment of strokes and exacerbations of heart failure.

The electrophysiology community may not be currently ready to provide the number of procedures required for an early interventional approach to the treatment of AF. However our interventional colleagues overcame a similar challenge in delivering wide-spread and early percutaneous coronary intervention in the treatment of coronary artery disease.

Conclusions

We present an argument for early ablation in the treatment of recurrent paroxysmal atrial fibrillation so to prevent negative left atrial substrate remodelling in the natural history of this progressive disease.

Disclosures

No disclosures relevant to this article were made by the authors.

References

1. Camm AJ, Al-Khatib SM, Calkins H, Halperin JL, Kirchhof P, Lip GY, Nattel S, Ruskin J, Banerjee A, Blendea D, Guasch E, Needleman M, Savelieva I, Viles-Gonzalez J, Williams ES. A proposal for new clinical concepts in the management of atrial fibrillation. Am Heart J 2012;164:292-302.

2. Allessie M. Atrial electrophysiologic remodelling. J Cardiovasc Electrophysiol 1998;9:1378-1393.

3. Nattell S, Burstein J, Dobrev D. Atrial remodelling and atrial fibrillation: mechanisms and implications. Circ Arrhythm Electrophysiol 2008;1:62-73.

4. Teh AW, Kistler PM, Lee G, Medi C, Heck PM, Spence SJ, Sparks PB, Morton JB, Kalman JM. Electroanatomic remodelling of the left atrium in paroxysmal and persistent atrial fibrillation patients without structural heart disease. J Cardiovasc Electro-physiol 2012;23:232-238.

5. Shah AN, Mittal S, Sichrovsky TC, Cotiga D, Arshad A, Maleki K, Pierce WJ, Steinberg JS. Long-term outcome following successful pulmonary vein isolation. Pattern and prediction of very late recurrence. J Cardiovasc Electrophysiol 2008;19:661-667.

6. Pappone C, Rosanio S, Oreto G, Tocchi M, Gugliotta F, Vicedomini G, Salvati A, Dicandia C, Mazzone P, Santinelli V, Gulletta S, Chierchia S. Circumferential radiofrequency ablation of pulmonary vein ostia. A new approach for curing atrial fibrillation. Circulation 2000;102:2619-2628.

7. Haïssaguerre M, Sanders P, Hocini M, Takahashi Y, Rotter M, Sacher F, Rostock T, Hsu LF, Bordachar P, Reuter S, Roudaut R, Clémenty J, Jaïs P. Catheter ablation of long-standing persistent atrial fibrillation: critical structures for termination. J Cardiovasc Electrophysiol 2005; 16:1125-1137.

8. Nademanee K, McKenzie J, Kosar E, Schwab M, Sunsaneewitayakul B, Vasavakul T, Khunnawat C, Ngarmukos T. A new approach for catheter ablation of atrial fibrillation; mapping of the electrophysiologic substrate. J Am College Cardiol 2004;43:2044-2053.

9. Pokushalov E, Romanov A, Shugayev P, Artyomenko S, Shirokova N, Turov A, Katritsis DG. Selective ganglionated plexi ablation for paroxysmal atrial fibrillation. Heart Rhythm 2009;6:1257-1264.

10. Jongnarangsin K, Suwanagool A, Chugh A, Crawford T, Good E, Pelosi F Jr, Bogun F, Oral H, Morady F. Effect of catheter ablation on progression of paroxysmal atrial fibrillation. J Cardiovasc Electrophysiol 2012;23:9-14.

11. Andrade JG, Khairy P, Guerra PG, Deyell MW, Rivard L, Macle L, Thibault B, Talajic M, Roy D, Dubuc M. Efficacy and safety of cryoballoon ablation for atrial fibrillation: a systematic review of published studies. Heart Rhythm 2011; 8:1444-1451.

12.Khaykin Y, Shamiss Y. Cost of AF Ablation: Where Do We Stand? Cardiol Res Pract. 2011; 2011:589781.