Editorial

Electrocardiographic Markers of Cardioversion Success in Patients with Atrial Fibrillation or Flutter

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Atrial fibrillation is the most common sustained cardiac arrhythmia in people. It is characterized by uncoordinated atrial activation associated with an irregular and often rapid ventricular response. Atrial flutter is a closely related supraventricular tachycardia. Atrial flutter, the second most common atrial arrhythmia, is a reentrant rhythm notable for an atrial rate typically between 240 to 400 beats per minute. It commonly includes an atrial ventricular block, with depolarizations to the ventricle that most often are conducted at a 2:1 ratio, with a 4:1 block being the next most common form.[1]

Atrial fibrillation affects approximately 2.3 million people in the United States and is expected to increase to 5.6 million by 2050. The overall estimated prevalence in the general population is 0.4–1%. It is uncommon before 60 years of age, but rapidly increases after that. It doubles in prevalence with each decade of age, affecting approximately 10% of the population for those in their eighties.[2] As such, it is a common medical condition treated by family physicians, internists, cardiologists, and other clinicians taking care of the elderly.

Not only is atrial fibrillation common, but it also is associated with serious health consequences. It accounts for about a third of hospital admissions for cardiac arrhythmias,[3] and increases the risk of stroke[4] and of overall mortality.[5] Both men and women with atrial fibrillation are about three times more likely than matched controls to develop heart failure.[6]

Atrial fibrillation is a costly public health issue, primarily due to hospital care for persistent or permanent atrial fibrillation. The leading cause for hospital admission was for cardioversion, followed by heart failure and implantation or change of pacemaker.[7] Thus, both for public health reasons and for the benefit of individual patients, it is important that the proper patients be identified for cardioversion, and the clinical care be tailored to the individual.

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In this issue of the *Southern Medical Journal*, Aloul et al[8] provide important insights into the success of direct current cardioversion in patients with atrial fibrillation and flutter. They found that patients with fine atrial fibrillation and atrial flutter were not only more likely to be successfully cardioverted, but were also more likely to remain in normal sinus rhythm one month later.

The decision about whether or not and how to cardiovert a patient and how to do it is multifaceted and primarily based upon age, symptoms, and evidence of structural heart disease. Should the patient be cardioverted, and, if yes, should chemical or direct current cardioversion be used? Is pre-procedure anticoagulation indicated? What medication regimen should be followed post-procedure? These issues require an in-depth understanding of the individual patient's relative risks and benefits.

The significance of the increased likelihood of maintaining sinus rhythm at one month in patients with fine atrial fibrillation is unclear. It is already known that most patients after a single cardioversion without prophylactic antiarrhythmic drugs will have a recurrence of their arrhythmia within the year.[9–11] However, this finding of success at one month may have particular importance in patients where the effect of their arrhythmia on symptoms is unclear. Often, patients will have other comorbid conditions that can result in the same symptoms as those resulting from atrial fibrillation. They may have fatigue or other vague symptoms that may or may not be due to their arrhythmia. In these patients, when there is a reasonable likelihood they will stay in sinus rhythm for at least a few weeks, it may be worthwhile to see what effect restoration of sinus rhythm has on their symptoms. If they are symptomatically much better after this trial, then more aggressive approaches including catheter-based pulmonary vein isolation may be indicated, in an attempt to maintain long-term sinus rhythm if they should have recurrence of their arrhythmia. This paper gives us some insight as to who would likely maintain sinus rhythm long enough to at least determine a symptom-rhythm correlation.

There are several limitations to their study that need to be kept in mind. The primary limitation is that the sample population was overwhelmingly male (74 out of 76, or 97%). The number of attempts at direct current cardioversion was not clearly stated. The value of knowing the one month success rate, versus the one year success rate for cardioversion is not known. The numbers of patients in the fine atrial fibrillation category was low and raises concern about the fragility of their statistics.[12,13] Because of these limitations, the clinical implications of the research by this group have yet to be determined.

Nevertheless, with the global aging of the population, the proper identification and treatment of these arrhythmias will continue to be an important topic. An improved knowledge of the electrocardiographic characteristics affecting the success

or failure of cardioversion will help improve the medical care and overall health of the elderly.

References

1. Goodacre S, Irons R. ABC of clinical electrocardiography: atrial arrhythmias. *BMJ* 2002;324:594–597.
2. Kannel WB, Benjamin EJ. Current perceptions of the epidemiology of atrial fibrillation. *Cardiol Clin* 2009;27:13–24, vii.
3. Fuster V, Rydén LE, Cannom DS, et al. ACC/AHA/ESC 2006 guidelines for the management of patients with atrial fibrillation—excutive summary. *Rev Port Cardiol* 2007;26:383–446.
4. Wolf PA, Abbott RD, Kannel WB. Atrial fibrillation as an independent risk factor for stroke: the Framingham Study. *Stroke* 1991;22:983–988.
5. Benjamin EJ, Wolf PA, D'Agostino RB, et al. Impact of atrial fibrillation on the risk of death: the Framingham Heart Study. *Circulation* 1998;98:946–952.
6. Stewart S, Hart CL, Hole DJ, et al. A population-based study of the long-term risks associated with atrial fibrillation: 20-year follow-up of the Renfrew/Paisley study. *Am J Med* 2002;113:359–364.
7. Le Heuzey JY, Paziaud O, Piot O, et al. Cost of care distribution in atrial fibrillation patients: the COCAF study. *Am Heart J* 2004;147:121–126.
8. Aloul BA, Adabag AS, Can I, et al. Electrocardiographic markers of cardioversion success in patients with atrial fibrillation. *South Med J* 2009;102:885–889.
9. Van Gelder IC, Crijns HJ, Tieleman RG, et al. Chronic atrial fibrillation. Success of serial cardioversion therapy and safety of oral anticoagulation. *Arch Intern Med* 1996;156:2585–2592.
10. Crijns HJ, Van Gelder IC, Tieleman RG, et al. Long-term outcome of electrical cardioversion in patients with chronic atrial flutter. *Heart* 1997;77:56–61.
11. Fetsch T, Bauer P, Engberding R, et al. Prevention of atrial fibrillation after cardioversion: results of the PAFAC trial. *Eur Heart J* 2004;25:1385–1394.
12. Feinstein AR. The unit fragility index: an additional appraisal of "statistical significance" for a contrast of two proportions. *J Clin Epidemiol* 1990;43:201–209.
13. Walter SD. Statistical significance and fragility criteria for assessing a difference of two proportions. *J Clin Epidemiol* 1991;44:1373–1378.

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