EDITORIAL COMMENT

Pulmonary Vein Isolation for Atrial Fibrillation in Low Ejection Fraction Patients: The Market Is Growing!*  
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With the widespread use of catheter ablation techniques in atrial arrhythmias in the 1980s, interest in clinical electrophysiology has grown as a premier subspecialty in cardiology. Yet after an initial strong impact in the number of catheter procedures and the opening of a higher number of centers offering these procedures, the cure of long-standing affected patients resulted in a plateau being reached. Even though anatomical and electrical properties of the pulmonary veins (PVs) have been studied as early as in the late 1960s, the clear relation to clinical atrial fibrillation (AF) came from more recent surgical and catheter ablation experience (1–4). As a consequence, the patient population amenable to catheter ablation procedures has grown again, albeit limited by the still relatively experimental nature of the procedure, which is partly the result of the large variety of approaches that relatively oppose each other conceptually (5–7) and technically (8–12).

Besides age, one of the intuitive limitations to catheter ablation of atrial fibrillation has been the presence of underlying congestive heart failure (CHF). Indeed poor New York Heart Association functional class status has been used as an exclusion criterion in some studies and is unreported or near normal in almost all others (3,4,13). Surprisingly, the literature has not been very accurate in unreported or near normal in almost all others (3,4,13).

It is well known that heart failure is often complicated and enhanced by AF and that the combination of both is associated with a poor prognosis. In the recently reported Framingham experience, it was found that CHF developing in the presence of AF was associated with a multivariate adjusted hazard ratio of 2.7 in men and 3.1 in women over a period of 5.6 years (15). Conversely, if AF developed in the presence of CHF, the hazard ratio was 1.6 in men and 2.7 in women. For men with AF, survival times for those with previous CHF, concurrent CHF, or no CHF at the time of AF diagnosis were 1.4, 2.1, and 6.6 years, respectively. Thus, both conditions produce additive deleterious effects. These data may appear to be difficult to reconcile with the recently published Atrial Fibrillation Follow-up Investigation on Rhythm Management (AFFIRM) and Rate Control versus Electrical cardioversion for persistent atrial fibrillation study group (RACE) trials, in which no survival benefit was found in the sinus rhythm restoration arm (16,17). These two trials have strongly influenced clinicians’ behavior with a tendency towards less aggressive therapy, at least in elderly patients.

CHF and AF: another chicken-or-the-egg dilemma revisited? In a recent elegant study, Sanders et al. (18) addressed the reason for the higher prevalence of AF in patients with CHF. Patients with CHF exhibited alterations in atrial electrophysiological properties, such as an increase in effective refractory period, conduction time, P-wave duration and corrected sinus node recovery time, and a greater number and duration of double potentials associated with areas of low voltage and electrical silence. An increased propensity for AF with single extrastimuli was also observed and, when induced, AF was more often sustained. Yet once AF has started, it may worsen heart

*Editorials published in the Journal of the American College of Cardiology reflect the views of the authors and do not necessarily represent the views of JACC or the American College of Cardiology.

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failure because of faster heart rate with shortened filling time, absence of atrial contribution to cardiac output, and irregularity of the ventricular rhythm, leading to further hemodynamic deterioration. Atrial dilation also plays an important role in the occurrence of CHF (19). Atrial dilation, which results during sustained AF, is also associated with (at least superior) PV ostial size, which in the current study was also found to be increased in the presence of CHF. Indeed, in the ablation literature, the size of the left atrium (LA) appears to increase the technical difficulty of procedures and the chance of late failure.

The study by Chen et al. (20) suggests that in the 60% of patients in whom AF was controlled, EF increased by a mean of 7.2%. A recent subanalysis of the RACE study is consistent with these findings, suggesting partial reversibility of atrial and ventricular anatomical and functional characteristics after prolonged AF periods. Of 283 patients from the initial 522 patient cohort, rhythm control was associated with a significant reduction of LA size, especially if sinus rhythm was maintained. Improvement of LV fractional shortening was significant only in the case of maintenance of sinus rhythm. In contrast, patients with hypertension showed progressive increase of atrial size that was independent of treatment strategy. Furthermore, a long duration of AF before study entry was associated with worsening of fractional shortening irrespective of treatment strategy, suggesting that the type of AF and comorbidities are associated important prognostic factors.

Post-ablation reversibility of atrial anatomical alteration has also recently been underlined by the world’s largest report on this technique by Pappone et al. (13), who in a nonrandomized study found that PV ablation improves morbidity, quality of life, and even mortality as compared with medical therapy. Of note in this study, the baseline size of the LA was a predictor of late success with a higher risk of relapse if the diameter was >45 mm. Additionally, a clear reduction in LA size was observed after ablation, especially in those without AF recurrence. All these reports suggest that restoration of sinus rhythm may beneficial, if it can be performed at a low iatrogenic cost.

Should ablation of CHF be proposed without limitations in all CHF patients? In our opinion, the great merit of the paper of Chen et al. (14) is that it is the first to address a population of patients that includes those who are thought to be the worst candidates for an ablation technique. Almost 100 patients with a mean EF of 36%, among which 56% had persistent or chronic AF for more than 5 years, underwent ablation with not only a very reasonable success but most importantly an acceptable rate of major complications. There was a nonsignificant trend toward EF improvement, but patients who completed quality of life questionnaires reported significant improvements in all parameters. Does this mean that ablation should be proposed systematically in all CHF patients? Certainly not, because the excellent success rate reported in this study was obtained with a sophisticated and expensive technique and by a particularly experienced ablation team. All patients, like in all published series to date, were symptomatic with the peculiarities in this subgroup that symptoms may have been largely due to heart failure. In addition, the studies of AF ablation reported so far still vary widely in terms of type of patient population, catheter type used, ablative energy and power level used, procedural end points, and methods for assessment of long-term success rates. Major complications still occur and may possibly be inconsistently reported, although as time goes complication rates seem to decrease. The technique is still evolving in many centers and often, at the time of article publication, the protocols have already changed in the author’s own center. The optimistic conclusion of the Chen et al. study (14) should be tempered by the fact that associated prognostic factors, such as age, type of heart disease, and other comorbidities, have not been fully addressed in this report. In addition, the authors studied a relatively small number of patients in a selected and nonrandomized fashion. Thus, as correctly pointed out by the authors in their conclusions, these observations are tentative at this point in time but are suggestive of the fact that this approach may safely address this subset of patients.

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REFERENCES