Atrial Fibrillation and Heart Failure
– Identification of Patients at Risk –
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Atrial fibrillation (AF) and congestive heart failure (CHF) frequently coexist; the presence of one increases the probability of developing the other. Unfortunately, AF is often asymptomatic until the onset of stroke or systemic embolization. Identification of high-risk characteristics for developing AF in patients with CHF would be particularly useful for designing strategies to monitor and detect AF before neurologic or embolic events occur.

Article p619

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Figure 1. Detection of atrial fibrillation at 6, 12, and 36 months using an insertable cardiac monitor (ICM) vs. control patients. CI, confidence interval. (Reproduced with permission from Sanna T, et al.)

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Future work is required to better characterize the precise structural and functional changes that promote AF in the CHF population.

A recent meta-analysis supports the concept that AF increases the risk of death in HF patients. Analyzing data from 16 studies including approximately 54,000 patients, Mamas et al found that AF was associated with an odds ratio for all-cause mortality between 1.15 (for 9 observation studies) and 1.4 (for 7 randomized trials).

AF is therefore an attractive target for improved detection and management. In the ASSERT study, approximately 10% of patients with implanted cardiac devices had subclinical atrial tachyarrhythmias; such individuals had a hazard ratio of 2.5 for the combined endpoints of stroke or systemic embolization. This finding highlights the importance of early AF diagnosis for initiation of anticoagulation or left atrial appendage closure, which reduces the subsequent risk of stroke. Detection and interruption of asymptomatic tachyarrhythmias (HFrEF) was reported by Wang and colleagues in an analysis of 1,470 patients from the Framingham Heart Study who developed AF or CHF. Of the 708 patients with CHF, 22% subsequently developed AF over a mean of 4.2 years, with an unadjusted rate of AF of 55 cases per 1,000 years, approximately 1.6-fold the risk of AF for patients without HFrEF (33 per 1,000 years). However, the precise mechanisms underlying this link remain incompletely defined.

Prior work has shown that increased LA pressure results in LA dilation, fibrosis, slow conduction, and increased AF risk. CHF is also accompanied by increased sympathetic activation, which may contribute to electrophysiologic changes, such as a shortened atrial refractory period, which promote AF. Additionally, HF activates a number of maladaptive and procoagulant pathways, including the renin-angiotensin-aldosterone system, which has been shown to accelerate cardiac fibrosis. However, the relative importance of each pathway is unclear.
cardia may also reduce the risk of tachycardia-induced cardiomyopathy. However, monitoring of the entire CHF population is impractical; delineation of high-risk populations is required.

In this issue of the Journal, Kato et al report the results of their analysis of patients enrolled in the WARCEF trial. They included 2,219 patients with clinical data alone, and 1,125 patients with both clinical and echocardiographic studies. At a mean follow-up of 3.5 years, 212 patients (9.6% of total cohort) developed AF, revealing an annual incidence of approximately 3%. New-onset AF was associated with age, male sex, white race, and ischemic heart disease (IHD). Among the echocardiographic variables, only left atrial diameter (LAD) predicted AF. Notably, subsequent investigation revealed that patients with IHD, LAD >4.5 cm, and age >50 years are at particularly high risk of AF (2.5-fold greater risk).

This study is an important contribution to our knowledge of patient characteristics associated with increased risk of AF in CHF. Importantly, these patient characteristics are relatively easy to ascertain; age and the presence of IHD can be obtained from the patient’s history. Echocardiography is indicated in the evaluation of patients with CHF. It is tempting to postulate that patients identified using these risk factors may benefit from more intense monitoring for AF.

Improvements in monitoring technologies now provide a number of options to evaluate for incident and subclinical arrhythmias. Outpatient telemetry is increasingly used both to detect and to establish the burden of episodes. Insertable cardiac monitors have demonstrated their ability to improve sensitivity for detecting AF in patients with cryptogenic stroke (Figure 1). Such technologies could potentially be used in the high-risk CHF population identified by Kato and colleagues to allow earlier diagnosis of atrial tachyarrhythmias. Future trials are required to conclusively determine whether such strategies (a) accelerate AF identification, (b) improve patient outcomes, and (c) are cost-effective.

CHF is a well-known risk factor for stroke and thromboembolism in AF. Therefore, the majority of AF patients with CHF should be considered for long-term anticoagulation. Once patients have been established on appropriate anticoagulation, they may be considered for either a rate control strategy in which atrioventricular node blocking agents are used to control heart rate during AF or a rhythm control strategy in which restoration of sinus rhythm is the focus. Initial studies primarily using antiarrhythmic drugs showed no difference in mortality or serious morbidity between rhythm and rate control strategies in AF patients with HF. However, more recent work has shown improved quality of life and LV function in patients assigned to catheter ablation vs. rate control alone (Figure 2), despite more numerous AF-sustaining sources in CHF patients. Such results support the hypothesis that ablation may be a superior approach to rhythm control compared with antiarrhythmic medication in symptomatic AF patients with CHF. Importantly, AF ablation has been shown to be more likely to be successful if performed earlier in course of AF, and timely diagnosis may permit more rapid referral of appropriate individuals.

Although the analysis by Kato et al was rigorously conducted, it is important to understand potential limitations of their study. First, the study was not the intended primary outcome of the WARCEF study, and the results of secondary analyses must be interpreted with caution. Second, just over half of the study patients had echocardiographic data available. There were some differences between the echo and non-echo groups, and thus potential bias may be present.

Nonetheless, the merits of the present study are worth emphasizing. First, the WARCEF study population is large, and likely represents patients seen in practice. Second, the surprising finding of increased AF risk at the relatively young age of 50 draws attention to significant differences between AF in the general population vs. AF in CHF patients. For comparison, the vast majority (over 80%) of AF in non-CHF patients occurs after the age of 65 years. Additionally, increased AF risk was seen with a relatively large LA diameter (>4.5 cm) in WARCEF. Prior work in the non-CHF population shows significantly increased AF risk for LA diameter greater than 4.0 cm.

In conclusion, the study by Kato et al is an important addition to our understanding of AF in CHF. The result may hopefully allow clinicians and investigators to focus on high-risk patients with CHF for increased monitoring and more rapid referral for AF therapies. Such work may ultimately reduce the burden of AF in this important population.

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