Atrial Fibrillation and Congestive Heart Failure

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KEYWORDS

• Atrial fibrillation • Congestive heart failure • Atrial fibrillation ablation • Antiarrhythmics
• Atrio-ventricular node ablation

KEY POINTS

- Heart failure (HF) and atrial fibrillation (AF) commonly coexist and adversely affect mortality when found together.
- AF begets HF and HF begets AF.
- Rhythm restoration with antiarrhythmic drugs failed to show a mortality benefit but can be effective in improving symptoms.
- Nonpharmacologic treatment of AF may be of value in the HF population.

INTRODUCTION

Heart failure (HF) and atrial fibrillation (AF) frequently coexist, with an associated increase in morbidity and mortality. Together they impose a significant impact on the economy and strain health care resources. Each condition can promote the other, via complex structural, electrophysiological, and neurohormonal processes. Recent research has advanced the understanding of the underlying mechanisms responsible for these relationships, and further work may provide future insight into optimal management. This article reviews the epidemiology, pathophysiology, treatment options, and outcomes associated with these 2 conditions in combination.

EPIDEMIOLOGY OF HF AND AF

AF is the most common sustained arrhythmia among adults. It imposes a considerable public health burden, currently affecting greater than 2 million people in the United States. This statistic is increasing as the population ages.[1] HF is also a significant and growing epidemic, with nearly 5.7 million American adults affected currently and greater than 500,000 new patients diagnosed annually.[2] Furthermore, patients with HF are now living longer; this is in part due to improved survival from acute coronary syndrome and advances in the acute and chronic management of patients with HF. Thus, both AF and HF are common. They also carry significant morbidity and mortality.

Collectively, these disorders have a substantial impact on the economy and also on the utilization of health care resources. For example, HF hospital admissions account for greater than 6.5 million hospital days annually[3] and HF-related costs reach an estimated $34.4 billion each year. This total includes the cost of health care services, medications, and lost productivity.[4] AF accounts for 35% of all hospital admissions for arrhythmias.[3] The average estimated cost of medical care for

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each patient with AF is approximately $8700 per year higher than when AF is absent.[5] Overall, the national estimated annual cost of caring for AF is approximately $26 billion.[5]

PROGNOSTIC SIGNIFICANCE OF HF AND AF IN COMBINATION

AF and HF frequently coexist, in part because of common risk factors (eg, hypertension, coronary artery disease, diabetes mellitus, valvular disease) and also because of their common tendency to occur in patients with advanced age (**Figs. 1** and **2**).[6] The overall prevalence of AF among patients with HF has been reported to be 13% to 41%.[6–8] These figures include prevalence data from several HF trials, such as The Vasodilator in Heart Failure Trial, as well as the largest followed community cohort, the Framingham Heart Study. In the Framingham study, at the first diagnosis of HF among study participants, 24% had concurrent or prior AF and another 17% developed AF during follow-up. In addition, the proportion of patients with AF is increased in patients with advanced New York Heart Association (NYHA) functional classification, from less than 5% in class I to 49% in class IV (**Fig. 3**).[9]

Temporal analysis of Framingham Study participants showed that AF preceded HF just as frequently as HF preceded AF, and the development of the second condition led to a worse prognosis. There was some gender-based variability in these relationships, however. For example, when men with AF developed HF, their expected mortality increased (hazard ratio [HR] 2.7; 95% confidence interval [CI], 1.9–3.7), and these findings were similar among women. In contrast, women with HF demonstrated more severe compounding of mortality when they later developed AF (HR 2.7, 95% CI, 2.0–3.6) as compared with men (HR 1.6; 95% CI, 1.2–2.1).[6]

Subsequent trials have also reported consistently worse outcomes when HF and AF coexist. For example, data from a large population in the Studies of Left Ventricular Dysfunction (SOLVD) demonstrated that concomitant AF in HF patients led to increased hospitalization (21 compared with 13 events per 100 participant-years, $P<.001$) and increased overall mortality (34% vs 23% over an average of 33.4 ± 14.3 months, $P<.001$).[10] Recent retrospective data from patients enrolled in the *Get with the Guidelines—Heart Failure* program showed that among patients hospitalized for HF, the presence of AF on admission

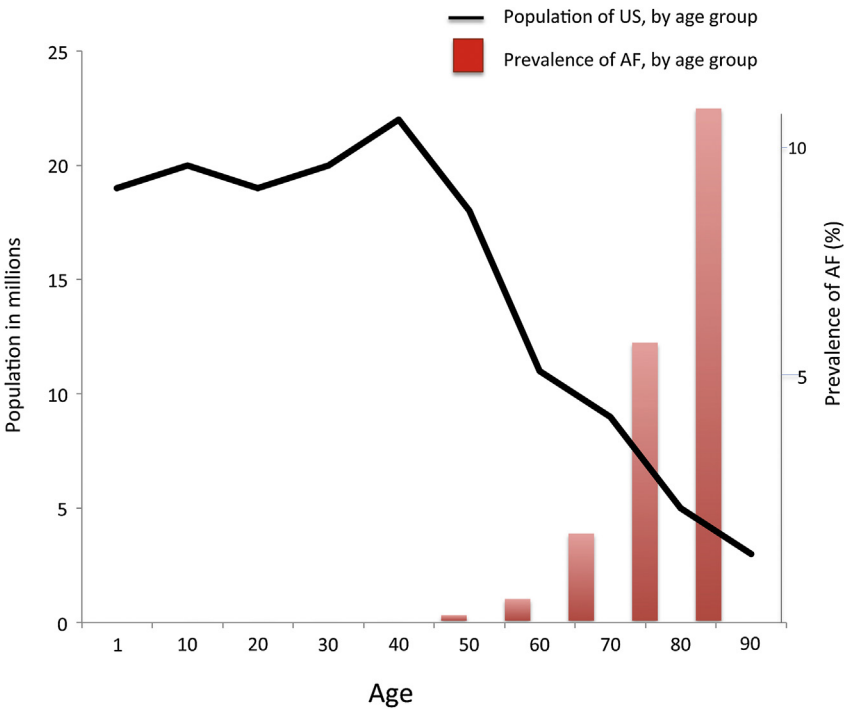

Fig. 1. Prevalence of AF according to age, and the US population by age, demonstrating that AF increases with age. (*Data from* Go AS, Hylek EM, Phillips KA, et al. Prevalence of diagnosed atrial fibrillation in adults: national implications for rhythm management and stroke prevention: the AnTicoagulation and Risk Factors in atrial fibrillation (ATRIA) study. JAMA 2001;285:2373; with permission.)