

# Heart Failure and Atrial Fibrillation



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## KEYWORDS

- Atrial fibrillation • Thromboembolism • Rate control • Rhythm control
- Cardioversion • Ablation

## KEY POINTS

- Atrial fibrillation is common in patients with heart failure.
- Rate control or rhythm control are 2 important strategies to consider when managing patients with heart failure who are in atrial fibrillation.
- Some patients with heart failure and atrial fibrillation benefit from cardioversion, device therapy with pacemakers or implantable cardioverter defibrillators, catheter, or surgical-based ablation.

## INTRODUCTION

Heart failure (HF) and atrial fibrillation (AF) are 2 commonly seen cardiovascular disorders that share multiple risk factors and continue to increase in the United States as well as worldwide. Each increase morbidity and mortality in patients, and when seen together, the impact can be additive because of the complex interaction between the 2 conditions.<sup>1-3</sup>

The burden of AF and HF is projected to surge due to our aging population and increased survival from other cardiovascular disease, especially coronary artery disease. Heart disease continues to be the predominant cause of death in both men and women in the United States. Nearly 6 million Americans suffer from HF and half of those newly diagnosed with HF will die within 5 years.<sup>4</sup> As of 2010, between 2.7 and 6.1 million people in the United States had AF and it is anticipated to be as high as 12 million by 2050 because of its steadily increasing rate.<sup>5</sup>

## THE HEART FAILURE-ATRIAL FIBRILLATION CONNECTION

HF and AF cause patients to have uncomfortable and potentially distressing symptoms, increase the risk of stroke, decrease quality of life and reduce longevity, while

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increasing health care costs. The association between AF and HF has been appreciated for decades, and it is well known that the presence of HF increases the risk of AF, whereas the presence of AF increases the risk of HF.<sup>6,7</sup> This has been described as a vicious cycle. More than 70% of patients with AF have underlying heart disease.<sup>8</sup> The prevalence of AF in those with HF ranges from 4% to 40% as the degree of HF worsens.<sup>1</sup> AF is defined by the duration of episodes of the arrhythmia. See **Table 1** for details about AF classifications.<sup>9</sup>

Although there are many shared risk factors between HF and AF, the pathophysiological relationship between AF and HF is not completely understood. Common risk factors of HF and AF include advanced age, hypertension, diabetes mellitus, coronary artery disease, and valvular heart disease. Additional risk factors for AF have been identified and can be seen in **Box 1**. Goals of therapy include management of symptoms and prevention of thromboembolism. Correction of potential underlying causes is needed as well as optimization of HF treatment.<sup>10,11</sup> Patients with HF with either systolic or diastolic dysfunction are at risk. Systolic HF is associated with a significantly increased risk of AF and is a strong predictor for the development of AF.<sup>12</sup> AF occurs when structural and/or electrophysiological abnormalities alter atrial tissue to promote abnormal impulse formation and/or propagation.<sup>9</sup>

AF is an uncoordinated supraventricular arrhythmia in which there is loss of atrial synchrony. This results in the loss of atrial contribution to the cardiac output, commonly referred to as loss of atrial kick.<sup>13</sup> Atrial contraction contributes 20% to 25% of left ventricular stroke volume.<sup>8,12</sup> This reduction in stroke volume leads to reduced cardiac output and lowered exercise tolerance. AF may cause valvular regurgitation, which causes reduction in forward blood flow. Rapid ventricular rates during periods of uncontrolled AF lead to inadequate ventricle filling time and decrease in stroke volume. An irregular ventricular response, in itself and independent of heart rate, causes a drop in cardiac output, increase in pulmonary wedge pressure, and elevation of right atrial pressure.<sup>12</sup>

The detrimental effects of AF on HF also may be worsened by antiarrhythmic therapy. Some antiarrhythmic drugs have negative inotropic effects, whereas others are considered proarrhythmic, meaning that it worsens existing arrhythmias or causes

**Table 1**  
Classification of atrial fibrillation

AF Type	Duration
Paroxysmal AF	AF that terminates spontaneously or with intervention within 7 d of onset. Episodes may recur with variable frequency.
Persistent AF	Continuous AF that is sustained >7 d.
Long-standing persistent AF	Continuous AF >12 mo in duration.
Permanent AF	The term "permanent AF" is used when the patient and clinician make a joint decision to stop further attempts to restore and/or maintain sinus rhythm.
Nonvalvular AF	AF in the absence of rheumatic mitral stenosis, a mechanical or bioprosthetic heart valve, or mitral valve repair.

*Abbreviation:* AF, atrial fibrillation.

From January CT, Wann LS, Alpert JS, et al. 2014 AHA/ACC/HRS guideline for the management of patients with atrial fibrillation: executive summary: a report of the American College of Cardiology/American Heart Association Task Force on Practice Guidelines and the Heart Rhythm Society. *J Am Coll Cardiol* 2014;64:2246–80; with permission.

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