

# Ablation of Atrial Arrhythmias in Heart Failure



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## KEYWORDS

- Atrial arrhythmia • Atrial fibrillation • Atrial fibrillation ablation • Heart failure • Antiarrhythmic drugs
- Rate control • Rhythm control

## KEY POINTS

- Atrial fibrillation (AF) may adversely affect outcome in heart failure (HF) patients. Restoration of sinus rhythm (SR) improves cardiac function.
- In HF patients, as in the general AF population, the choice of a rhythm or rate control strategy is controversial.
- The efficacy of antiarrhythmic drugs (AADs) is generally poor, and the benefits of maintaining SR may be outweighed by their adverse effects.
- AF ablation offers the opportunity to maintain SR while avoiding the adverse effects of AADs.
- AF ablation is superior to AADs in HF patients to improve prognostic markers including left ventricular ejection fraction, exercise tolerance, and quality of life.
- Ablation also of non-pulmonary vein triggers appear important in order to achieve long-term freedom from arrhythmia in patients with concomitant AF and HF.

## INTRODUCTION

The incidence of both heart failure (HF) and atrial fibrillation (AF) are on the rise, and they often coexist. Pharmacologic rhythm control has not been shown to improve outcomes compared with pharmacologic rate control in AF patients, possibly because of the adverse effects of antiarrhythmic drugs (AADs). Catheter ablation offers an opportunity to achieve SR without the downside of AADs. Several studies have shown that AF ablation improves prognostic markers,

including ventricular function, exercise tolerance, and quality of life in HF patients with AF. Large randomized controlled trials comparing AF ablation with pharmacologic therapy are ongoing.

## ATRIAL ARRHYTHMIAS

AF is by far the most common form of atrial arrhythmia in HF patients. Other forms include typical atrial flutter, atypical atrial flutter, and atrial tachycardia. Catheter ablation is the treatment of choice for typical atrial flutter and has a high

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success rate and low complication rate. For the other atrial arrhythmias, various medical therapy strategies or ablation can be considered. This article focuses on ablation of AF.

## EPIDEMIOLOGY

AF and HF are considered the 2 current epidemics of cardiovascular disease.<sup>1</sup> AF is the most common arrhythmia in clinical practice, and both its incidence and prevalence are expected to rise due to the aging population.<sup>2</sup> HF is the most common hospital discharge diagnosis in the United States, and it consumes more health care dollars than any other disease.<sup>3</sup> Despite therapeutic advances, the prognosis in HF remains poor, with an estimated 5-year survival of 25% to 38%.<sup>4</sup>

Importantly, the 2 conditions often coexist. The prevalence of AF in HF patients ranges from 13% to 27%,<sup>4-8</sup> and increases with HF severity, from 5% in patients with mild HF to more than 50% in patients with severe disease.<sup>9</sup> Coexistence of HF and AF is associated with an increased risk for hospitalization, stroke, and mortality.<sup>10-12</sup>

## PATHOPHYSIOLOGY

The pathophysiological relationship between AF and HF is incompletely understood. Some of the coexistence can be attributed to shared risk factors including age, diabetes, hypertension, obesity, sleep apnea, valvular disease, coronary artery

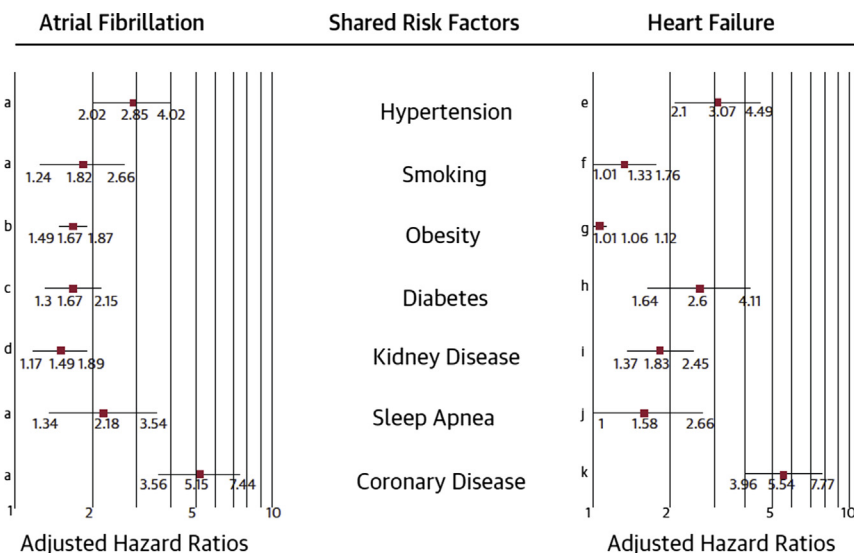
disease, and structural heart disease (Fig. 1).<sup>13</sup> However, a vicious cycle, where AF begets HF, and HF begets AF also plays an important role (Fig. 2).<sup>14-16</sup>

AF may facilitate the development and progression of HF through several mechanisms:

- Heart rate (HR) elevation in AF may cause myocardial ischemia, energy depletion, and calcium handling abnormalities that eventually lead to tachycardia-induced cardiomyopathy.<sup>17-20</sup> This mechanism is thought to contribute to left ventricular dysfunction in up to 50% of patients with concomitant HF and AF.
- The decreased ventricular filling during short cardiac cycles in AF cannot be fully compensated for during longer cycles, which leads to a decrease in total cardiac output.<sup>21</sup>
- The loss of atrial contraction and atrioventricular synchrony in AF further reduces cardiac output.
- Antiarrhythmic drug (AAD) therapy used to maintain sinus rhythm (SR) may worsen HF through negative inotropic and proarrhythmic effects.<sup>17</sup>

Conversely, there are also several ways through which HF can facilitate the development and progression of AF:

- Elevated left ventricular filling pressure, functional valvular regurgitation, and renin-angiotensin-aldosterone (RAAS) mediated volume retention in HF induce left atrial dilation.



**Fig. 1.** Hazard ratio of incident AF and HF according to shared risk factors. Adjusted hazard ratios (95% confidence limits) of AF and HF according to 7 shared risk factors. These data were gathered through the studies of various cohorts. If overall cohort data were unavailable or not reported, results from white and/or male patients (both the largest subgroups) were reported. (From Trulock KM, Narayan SM, Piccini JP. Rhythm control in heart failure patients with atrial fibrillation: contemporary challenges including the role of ablation. *J Am Coll Cardiol* 2014;64(7):712; with permission.)

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