should incorporate the concomitant or stand-alone CMP-IV procedure for the management of eligible patients with AF or HF with or without correctable structural heart disease, respectively. The article provides a valuable clinical framework to potentially serve many more patients with biatrial CMP-IV procedure, and their appeal is worthy of consideration by the Society's Guidelines Committee.

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Commentary: “Chicken or the egg”: The causality dilemma of atrial fibrillation and congestive heart failure

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In their article in this issue of the *Journal*, Khiabani and colleagues¹ advocate surgical ablation of atrial fibrillation (AF) in patients with heart failure (HF). AF and HF can coexist, which can lead to a vicious cycle, with both being a potential cause and/or consequence. This association between AF and HF was appreciated long ago and raises

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CENTRAL MESSAGE

The success and clinical impact of stand-alone or concomitant surgical ablation of atrial fibrillation (AF) in the presence of heart failure are directly related to whether AF is a cause of or the result of heart failure.

the question of “atrial fibrillation or heart failure?” in a way similar to that in the folk paradox of the “chicken or the egg” first proposed by ancient Greek philosophers to describe the problem of determining cause and effect. However, unlike with the chicken and the egg, determining causality in the case of AF in HF is critical for success.

The pathophysiological relationship between AF and HF is complex and variable and while it has been extensively

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studied, a complete understanding of optimal AF treatment remains elusive in this setting. Conventional treatment for AF is focused on rate and rhythm control using antiarrhythmic drugs and anticoagulation therapy based on the individual risk profile. Medical therapy alone in the setting of HF has limitations owing to a lack of atrial-specific agents, modest efficacy, and significant toxicities of antiarrhythmic drugs. Surgical treatment of AF was first described by Cox² and remains the gold standard, but the original approach has been modified numerous times in response to the development of various lesion sets and alternate energy sources.

The greater efficacy of surgical AF ablation is balanced by its greater invasiveness, and as a result, it has been largely replaced by catheter ablation as a stand-alone procedure, especially in high-risk HF patients. The authors use deductive reasoning to support stand-alone or concomitant surgical ablation of AF in the setting of HF based on evidence from large, randomized clinical trials (CASTLE³ and CABANA⁴) in which catheter ablation proved superior to medical therapy in improving functional outcomes. We do agree that because surgical ablation is more efficacious than catheter ablation in ablating AF, this could be justified in the setting of HF. However, before considering surgery for AF, it is imperative to ascertain whether the AF is the cause or consequence of the HF, as the expected outcomes are vastly disparate. Surgical ablation for tachycardia-induced cardiomyopathy has been shown to reliably ablate AF and improve heart function⁵; however, this would not necessarily be expected if AF is a consequence of a long-

standing nonischemic dilated cardiomyopathy or has been present for any significant period. The underlying substrate in these 2 situations is not comparable, and as such, results are equally not comparable.

In the current era, surgical techniques have evolved to a hybrid endocardial and epicardial ablation approach. This combines the “best of both worlds” and optimizes the most effective aspects of each individual approach, which could result in optimizing outcomes while minimizing invasiveness. Although the answer for the metaphorical question in the title is quite simplified by Neil deGrasse Tyson—“which came first, the chicken or the egg? The egg, laid by a bird that was not a chicken”—the association between AF and HF is more complicated and should guide decision making, as it most certainly impacts outcomes.

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