

Atrial fibrillation ablation in patients with heart failure with preserved ejection fraction: Complexities in diagnosis and treatment



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Heart failure with preserved ejection fraction (HFpEF) frequently coexists in patients with atrial fibrillation (AF). This close relationship is unsurprising given the shared risk factors and pathophysiological mechanisms underlying both conditions.¹ However, the clinical implications of HFpEF in patients with symptomatic AF remain unclear. Specifically, the efficacy and safety of rhythm control strategies in patients with coexistent HFpEF is uncertain. Growing evidence suggests that catheter ablation is an effective treatment for heart failure with reduced ejection fraction (HFrEF),² but evidence in patients with HFpEF remains sparse. In this context, the article by Krishnamurthy and colleagues,³ investigating short-term procedural outcomes in patients with HFpEF undergoing AF ablation, represents an important addition to the literature.

This study involved retrospective analysis of the National Readmissions Database to identify all hospitalizations for catheter ablation between 2010 and 2014 in the United States. Primary International Classification of Diseases–Ninth Revision–Clinical Modification (ICD-9-CM) codes for diastolic and systolic heart failure (HF) were used to additionally identify all those with coexistent HFpEF and HFrEF. Outcomes assessed were procedural complications and 30-day hospital readmissions, which were also identified using ICD-9-CM codes. Of 50,299 patients with admission for catheter ablation, 4.5% had a coexistent diagnosis of HFpEF and 5.4% had HFrEF. Compared with patients with no HF, HFpEF patients were older, were more commonly women, and displayed a higher burden of cardiovascular risk factors. While unadjusted analyses revealed an association between HFpEF and increased risk of procedural complications, adjustment for age, comorbidities, and other hospital factors (region and size) demonstrated no independent effect of HFpEF on catheter ablation complications. However, HFpEF was independently associated with

increased risk of all-cause readmissions and HF readmissions, compared with those without HF.

The authors are to be commended for identifying and investigating an important clinical question; HFpEF in patients with AF is an underappreciated factor that may influence outcomes. These data highlight the significant clinical implications of coexistent HFpEF in patients with symptomatic AF, providing novel evidence that HFpEF independently increases the risk of 30-day hospital readmission following catheter ablation. Importantly, the study included more than 2000 patients with HFpEF, making it the largest study to date of ablation outcomes comparing HFpEF with no HF. In addition, the opportunity to objectively quantify readmissions and complications using the National Readmissions Database is a strength of the study. These findings highlight the potential early risks of catheter ablation in patients with HFpEF, which should be considered in the shared decision-making process for patients with HFpEF contemplating catheter ablation for treatment of AF.

These findings should, however, be considered in the context of several limitations. The major drawback was the diagnosis of HFpEF, which in patients with symptomatic AF is notoriously challenging due to overlapping clinical signs and symptoms. The gold-standard test for diagnosis of HFpEF remains invasive assessment of left ventricular end-diastolic pressures but noninvasive diagnostic scoring systems, incorporating patient characteristics, echocardiographic parameters, and biomarker levels, have also been developed to aid accurate diagnosis.^{4,5} These tools were not utilized in this study, which instead relied on the ICD-9-CM code for diastolic HF, a far less sensitive definition of HFpEF. The limited diagnosis of HFpEF is highlighted by the fact that only 4.5% of the cohort had HFpEF, inconsistent with previous studies utilising noninvasive HFpEF scoring tools or invasive hemodynamic assessment, which have shown the prevalence of HFpEF in AF ablation cohorts to be considerably higher.^{6,7} HFpEF has likely therefore been underdiagnosed in this study, and potentially limited to a sicker cohort. As a result, the rate of

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complications may not reflect that of an HFpEF cohort diagnosed more stringently.

Another important consideration is the time period studied. The authors evaluated AF ablation procedures from 2010 to 2014. Since this time, ablation procedures have evolved, with improved mapping and ablation technologies. As a result, complication rates have declined by as much as 30% over the past 10 years.⁸ In addition, indications for AF ablation have expanded, with increasing evidence for benefit in HFrEF patients.² The HFrEF cohort in this study may not, therefore, be representative of current HFrEF patients undergoing AF ablation. These data therefore require further validation within a contemporary cohort of patients undergoing AF ablation.

Despite these limitations, this study provides interesting data regarding the risks of catheter ablation for patients with HFpEF, specifically with respect to increased risk of re-admission to hospital within 30 days. Importantly, the study provides a real-world counterpoint to the findings of 2 recently published substudies of major randomized controlled trials, which showed that rhythm control strategies for patients with HF (including both HFrEF and HFpEF) were superior to medical therapy in reducing major cardiac outcomes.^{9,10} The study highlights the importance of thorough clinical assessment to identify HF, coupled with effective counseling of patients with HFpEF for potential additional risks associated with AF ablation. However, more work is required to evaluate the efficacy and safety of catheter ablation in this underrecognized cohort of patients. Postablation AF recurrence in patients with HFpEF will be important to evaluate and may be higher in this cohort given the increased prevalence of cardiovascular risk factors. Indeed, aggressive risk factor management, which has been shown to be effective in improving symptoms and quality of life in patients with symptomatic AF,^{11,12} may be particularly relevant to this cohort of patients. However, critical to any further study of catheter ablation in HFpEF will be accurate diagnosis of HFpEF, using hemodynamic evaluation or validated noninvasive scoring systems, in an unselected cohort of patients undergoing AF ablation. This will be essential to determine the true prevalence of HFpEF in patients undergoing AF ablation, the impact of HFpEF on patient symptoms, and the potential role of catheter ablation in improving outcomes for these patients.

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References

1. Ariyaratnam JP, Elliott AD, Mishima RS, Gallagher C, Lau DH, Sanders P. Heart failure with preserved ejection fraction: an alternative paradigm to explain the clinical implications of atrial fibrillation. *Heart Rhythm O2* 2021;2:771–783.
2. Marrouche NF, Brachmann J, Andresen D, et al. Catheter ablation for atrial fibrillation with heart failure. *N Engl J Med* 2018;378:417–427.
3. Krishnamurthy A, Goyal P, Markowitz SM, et al. Outcomes of patients with heart failure with preserved ejection fraction undergoing catheter ablation of atrial fibrillation. *Heart Rhythm O2* 2022;3:501–508.
4. Pieske B, Tschöpe C, De Boer RA, et al. How to diagnose heart failure with preserved ejection fraction: the HFA-PEFF diagnostic algorithm: a consensus recommendation from the Heart Failure Association (HFA) of the European Society of Cardiology (ESC). *Eur Heart J* 2019;40:3297–3317.
5. Reddy YNV, Carter RE, Obokata M, Redfield MM, Borlaug BA. A simple, evidence-based approach to help guide diagnosis of heart failure with preserved ejection fraction. *Circulation* 2018;138:861–870.
6. Sugumar H, Nanayakkara S, Vizi D, et al. A prospective Study using invasive haemodynamic measurements following catheter ablation for AF and early HFpEF: STALL AF-HFpEF. *Eur J Heart Fail* 2021;23:785–796.
7. Zylla MM, Leiner J, Rahm A-K, et al. Catheter ablation of atrial fibrillation in patients with heart failure and preserved ejection fraction. *Circ Heart Fail* 2022;15:e009281.
8. Ngo L, Ali A, Ganesan A, Woodman R, Adams R, Ranasinghe I. Ten-year trends in mortality and complications following catheter ablation of atrial fibrillation. *Eur Heart J Qual Care Clin Outcomes* 2022;8:398–408.
9. Packer DL, Piccini JP, Monahan KH, et al. Ablation versus drug therapy for atrial fibrillation in heart failure. *Circulation* 2021;143:1377–1390.
10. Rillig A, Magnussen C, Ozga A-K, et al. Early rhythm control therapy in patients with atrial fibrillation and heart failure. *Circulation* 2021;144:845–858.
11. Pathak RK, Middeldorp ME, Lau DH, et al. Aggressive risk factor reduction study for atrial fibrillation and implications for the outcome of ablation. *J Am Coll Cardiol* 2014;64:2222–2231.
12. Pathak RK, Middeldorp ME, Meredith M, et al. Long-term effect of goal-directed weight management in an atrial fibrillation cohort. *J Am Coll Cardiol* 2015;65:2159–2169.