

ORIGINAL INVESTIGATIONS

Long-Term Effect of Goal-Directed Weight Management in an Atrial Fibrillation Cohort



A Long-Term Follow-Up Study (LEGACY)

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ABSTRACT

BACKGROUND Obesity and atrial fibrillation (AF) frequently coexist. Weight loss reduces the burden of AF, but whether this is sustained, has a dose effect, or is influenced by weight fluctuation is unknown.

OBJECTIVES This study sought to evaluate the long-term impact of weight loss and weight fluctuation on rhythm control in obese individuals with AF.

METHODS Of 1,415 consecutive patients with AF, 825 had a body mass index ≥ 27 kg/m² and were offered weight management. After screening for exclusion criteria, 355 were included in this analysis. Weight loss was categorized as group 1 ($\geq 10\%$), group 2 (3% to 9%), and group 3 ($< 3\%$). Weight trend and/or fluctuation was determined by yearly follow-up. We determined the impact on the AF severity scale and 7-day ambulatory monitoring.

RESULTS There were no differences in baseline characteristics or follow-up among the groups. AF burden and symptom severity decreased more in group 1 compared with groups 2 and 3 ($p < 0.001$ for all). Arrhythmia-free survival with and without rhythm control strategies was greatest in group 1 compared with groups 2 and 3 ($p < 0.001$ for both). In multivariate analyses, weight loss and weight fluctuation were independent predictors of outcomes ($p < 0.001$ for both). Weight loss $\geq 10\%$ resulted in a 6-fold (95% confidence interval: 3.4 to 10.3; $p < 0.001$) greater probability of arrhythmia-free survival compared with the other 2 groups. Weight fluctuation $> 5\%$ partially offset this benefit, with a 2-fold (95% confidence interval: 1.0 to 4.3; $p = 0.02$) increased risk of arrhythmia recurrence.

CONCLUSIONS Long-term sustained weight loss is associated with significant reduction of AF burden and maintenance of sinus rhythm. (Long-Term Effect of Goal directed weight management on Atrial Fibrillation Cohort: A 5 Year follow-up study [LEGACY Study]; [ACTRN12614001123639](https://doi.org/10.1016/j.jacc.2015.03.002)) (J Am Coll Cardiol 2015;65:2159-69) © 2015 by the American College of Cardiology Foundation.

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ABBREVIATIONS AND ACRONYMS

- AF** = atrial fibrillation
- AFSS** = Atrial Fibrillation Severity Scale
- AHI** = apnea-hypopnea index
- BMI** = body mass index
- BP** = blood pressure
- hsCRP** = high-sensitivity C-reactive protein
- IVS** = interventricular septum
- LA** = left atrium

Recent epidemiological data confirmed the emergence of obesity and atrial fibrillation (AF) as global epidemics (1,2). In the United States, the prevalence of obese individuals has risen 3-fold since 1960, with 1 in every 3 persons being obese (3). If such trends continue unabated, it is estimated that 164 million Americans will be obese by 2030, with an additional health care cost of \$66 billion annually (4,5). The prevalence of AF is projected to reach 15.9 million in the United States by 2050 (2,6,7). Because obesity is independently associated with AF, these dual epidemics confer an enormous management and economic burden (8-11).

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Obesity and its associated cardiometabolic comorbidities, such as hypertension, diabetes mellitus, and sleep apnea have been proposed as contributors to the expanding epidemic of AF (8,12,13), and are thus potential targets for intervention to stem the expanding AF epidemic. Weight loss in the short term results in a reduction in the symptomatic AF burden (14). Recent data demonstrated that aggressive weight and risk factor management improves maintenance of sinus rhythm after AF ablation (15).

Whether a critical weight loss threshold is required, or if benefits conferred by the initial weight loss are sustained in the long term is unknown. Furthermore, obese individuals frequently oscillate in weight over time, and the impact of such weight fluctuation on the arrhythmia burden is not known. We hypothesized that weight loss, if sustained, will be of incremental benefit in rhythm control. In this study, we assess the long-term impact of weight loss and weight fluctuation on rhythm control in obese individuals with AF.

METHODS

STUDY POPULATION. The study included consecutive patients who were referred for management of symptomatic paroxysmal or persistent AF to the Centre for Heart Rhythm Disorders at the University of Adelaide, Adelaide, Australia. All patients with a body mass index (BMI) ≥ 27 kg/m² were included in this analysis. Exclusion criteria were permanent AF, history of myocardial infarction or cardiac surgery in the previous 12 months, significant cardiac valvulopathy or ventricular dysfunction, active malignancy, autoimmune or systemic inflammatory diseases, severe renal or hepatic failure, and <24 months of follow-up.

The study protocol was approved by the Human Research Ethics Committee of the Royal Adelaide Hospital and University of Adelaide, Adelaide, Australia.

STUDY PROTOCOL AND DESIGN. All patients were counseled on the importance of weight and risk factor management, with optional participation in a dedicated physician-led weight management clinic or self-managed weight loss program.

Weight management. The weight and other risk factor management protocols have been presented previously and are outlined in the [Online Appendix \(15\)](#). In brief, a structured motivational and goal-directed program using face-to-face counseling was used for weight reduction. Patients were reviewed regularly (every 3 months in the initial phase), and encouraged to use support counseling and schedule more frequent reviews as required. Initial weight reduction was attempted by a meal plan and behavior modification. Participants were required to maintain a diet and physical activity diary. Meals consisted of high protein and low glycemic index, calorie-controlled foods. If patients lost <3% of weight after 3 months, they were then prescribed very-low-calorie meal replacement sachets (Prima Health Solutions,

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