

EDITORIAL COMMENT

Failure and Fatness

Could Surgical Management of Obesity Reduce Heart Failure Hospitalizations?*



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Obesity is an independent risk factor for heart failure (HF) development (1,2), particularly HF with preserved ejection fraction (HFpEF) (3). Bariatric surgery can achieve marked weight loss and a reduction in cardiovascular events after bariatric surgery (4-6), but the role of surgical weight loss in HF has been more contentious. One reason is the “obesity survival paradox.” Multiple epidemiology studies suggest that overweight/obese HF patients may have a lower mortality risk compared with their normal-weight peers (7,8). The risk of HF rehospitalization may also be lower in obese patients (9). Several methodological considerations may explain the paradox, such as a lead-time bias with earlier HF presentation in obese patients, a healthy survivor effect whereby more obese patients die before HF develops, and inadequate risk adjustment between obese and nonobese cohorts (10-12). However, there could also be a genuinely protective role of obesity in avoiding cardiac cachexia or of the positive myocardial effects of the adipokines and gut hormones that are up-regulated in obesity.

A second source of uncertainty arises from the impact of obesity on the HF diagnosis. Symptoms of HF and severe obesity may be difficult to

differentiate; dyspnea on exertion, lower extremity swelling, orthopnea, and limitations in functional capacity are features of both conditions. Furthermore, increased jugular venous pressure and the presence of ascites may be difficult to determine in an obese patient, and the brain natriuretic peptide (BNP) and N-terminal pro-B-type natriuretic peptide (NT-proBNP) are inversely associated with body mass index (13); BNP/NT-proBNP appears to increase after gastric bypass surgery (14). Therefore, investigators can face challenges both in determining whether patients with a diagnosis of both HF and obesity truly have HF (especially HFpEF) and in accurately measuring HF improvements after weight loss. Some investigators have chosen to focus on objective measures of cardiac function, such as seeking improvements in left ventricular ejection fraction (LVEF) after bariatric surgery in systolic HF (15,16), although our forthcoming data from the Cleveland Clinic suggest that the post-operative change in LVEF in patients with systolic HF may be more modest and heterogeneous than the earlier reports on this topic (in press, *Circulation: Heart Failure*).

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Thus, Shimada et al. (17) are to be commended on their study reported in this issue of the *Journal* examining the impact of bariatric surgery on subsequent HF hospitalizations and emergency department (ED) visits. By focusing on an objective clinical HF endpoint that is equally relevant to patients, physicians, and payers, the authors have made a very important first step in determining whether bariatric surgery or other weight loss interventions relieve the burden of illness experienced by HF patients who are obese. The authors performed a case series study of 524 obese patients, sampled from 3 states, coded with HF before bariatric surgery.

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In the pre-surgical reference period, 16.2% (95% confidence interval [CI]: 13.1% to 19.4%) of patients had an ED visit or hospitalization for HF compared with 9.9% in post-surgery months 13 to 24 (95% CI: 7.4% to 12.5%, adjusted odds ratio: 0.57; 95% CI: 0.39 to 0.82, $p = 0.003$). The strengths of this study include the use of all-payer data from the Healthcare Cost and Utilization Project (HUCP) and the ability to longitudinally track individuals to permit intra-person comparisons and limit confounding. Both clinical and policy insights arise from the analysis. It appears that surgical weight loss might be a strategy for appropriately selected HF patients to reduce the clinical manifestations of their cardiac disease. This is of particular importance given the health care burden of HF hospitalizations—>1 million U.S. patients are hospitalized annually with a primary diagnosis of HF, with hospital costs running into the billions of dollars (18)—and the paucity of medical therapies with proven outcome benefits in HFpEF. The prospect that bariatric surgery could potentially be the first intervention to offer mortality reduction in the HFpEF population is a tantalizing hypothesis worthy of further exploration.

The use of large administrative databases brings potential weaknesses from possible inaccuracies and incompleteness of diagnostic coding. As above, there are specific challenges in accurately coding an HF exacerbation in obese patients, and despite the thoughtful sensitivity analysis using pulmonary visits, it remains possible that some pre-surgical HF presentations may have been manifestations of obesity rather than true cardiac decompensations. These data do not distinguish between reduced and preserved ejection fraction HF, and we do not know

how severely obese the cohort was pre-operatively. Future analyses in the field could explore whether reductions in HF exacerbations follow a similar time scale as post-surgical reductions in weight, blood pressure, or left ventricular hypertrophy. The ideal next study would be a prospective, randomized, controlled trial of bariatric surgery versus standard management of patients with HF and severe obesity, incorporating objective measures of cardiorespiratory functional capacity, such as lean-body mass adjusted peak Vo_2 . Data on changes in HF medications post-bariatric surgery—especially diuretic requirements—would be important to ensure that any reduction in exacerbations is not due to peri-operative medication adjustments, which are much more likely to be required post-bariatric surgery than after cholecystectomy or hysterectomy. It also will be essential to prospectively quantify the risk of mortality in obese patients with HF both with and without bariatric surgery and account for post-surgical deaths in the analysis of HF hospitalizations.

In conclusion, the relationship between HF and obesity is complex, with the public health implications of both conditions underscoring the urgency of evaluating the effect of weight loss on clinical HF outcomes. This analysis of HF exacerbations turns a much needed focus toward the potential for bariatric surgery to address not only the epidemic of fatness, but also the epidemic of failure.

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