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Long-Term Changes in Cardiac Structure and Function Following Bariatric Surgery

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💬 1 Expert Comment



TAKE-HOME MESSAGE

- This study investigated the effects of long-term weight loss following bariatric surgery on cardiovascular risk factors, cardiac structure and function, ventricular interaction, and body composition. The authors found that decreases in BMI were associated with favorable reductions in BP, fasting glucose, and LV remodeling. Weight loss was also associated with a reduction in epicardial adipose thickness and LV and RV longitudinal strain. Interestingly, LA strain, volume, and pressure parameters worsened following weight loss.
- These findings suggest that weight loss following bariatric surgery is associated with improvements in cardiac structure, function, and ventricular interdependence. Additional studies comparing the effects of surgically mediated weight loss with those of medication-assisted weight loss, such as with GLP-1 receptor agonists, are warranted.

– [Zachary J. Hermes, MD, MPH \(/author/zachary-hermes/5965\)](/author/zachary-hermes/5965)

♥ Cardiology



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Obesity has now become one of the largest healthcare problems in the western world. It affects around 40% of all adults in the US, and it causes an estimated 4 million deaths per year.¹ Today, bariatric surgery is the most durable treatment option for patients with severe obesity because it leads to significant and sustained weight loss and a concomitant improvement in cardiovascular (CV) risk factors, such as hypertension, dyslipidemia, and diabetes mellitus. Moreover, it has now also been shown that bariatric surgery for patients with severe obesity is strongly associated with a reduction in all-cause and CV mortality, myocardial infarction, and heart failure compared with well-matched patients who did not undergo bariatric surgery.² However, adequately powered, randomized controlled trials in this field are absent. Therefore, the underlying mechanisms on why bariatric surgery for severe obesity is associated with this large reduction in mortality and, more specifically, a 50% reduction in the risk for heart failure remain largely unknown.

This study by Sorimachi et al investigated the long-term effects of bariatric surgery on cardiac structure and function in patients with severe obesity. For this purpose, they retrospectively identified 213 patients who all underwent bariatric surgery and who have available echocardiographic data before surgery and >180 days after surgery. Besides left ventricular (LV), right ventricular (RV), and left atrial (LA) size and function, the authors also measured epicardial adipose tissue on echocardiography. In a subset of 52 patients in whom abdominal CT scans were available before and after surgery, the authors measured the amount of abdominal visceral adipose tissue. There was no control group. During a median follow-up of 5.3 years, the authors found a 22% reduction in body mass index (BMI) and a 30% reduction in the amount of visceral adipose tissue. On average, the amount of epicardial adipose tissue was reduced by 14% after bariatric surgery. After bariatric surgery, there was a significant reduction in LV mass, an improvement in LV global longitudinal strain, a reduction in RV size, and an improvement in biventricular size and morphology. Despite this overall improvement in biventricular size and function, there was an increase in LA volume, a decrease in LA reservoir strain, and an increase in estimated LV filling pressures. The impairments in LA size and function and in filling pressures were more pronounced in patients who also developed new-onset heart failure during follow-up. However, both patients with and without development of new-onset atrial fibrillation demonstrated a similar decline in LA performance. The findings in this study are interesting for several reasons. First, the relative reduction in visceral adipose tissue volume was larger than the relative reduction in BMI. In addition, compared with the reduction in BMI, the reduction in visceral adipose tissue was, in general, more strongly associated with improvements in biventricular structure and function. These findings underscore the notion that the amount of visceral adipose tissue, rather than general obesity based on BMI, is much more important. Therefore, primarily relying on BMI as a threshold for bariatric surgery seems not always appropriate because patients with disproportionately high visceral adipose tissue relative to their BMI may potentially also benefit from bariatric surgery, even when they have a BMI below the threshold for surgery. Second, although ventricular structure and function improved after bariatric surgery, LA size and function and estimated LV filling pressures still deteriorated after bariatric surgery, which was associated with the development of heart failure. This is important because some patients are perhaps operated on too late and irreversible cardiac changes have already occurred due to the longstanding, severe adiposopathy. Perhaps that the LA is much more vulnerable for severe obesity in this regard. Hypothetically, this may also be the reason why the association between bariatric surgery and the reduction in risk for atrial fibrillation was far less pronounced.²

In conclusion, the study by Sorimachi et al provides meaningful, mechanistic insights into the beneficial effects of bariatric surgery on cardiac performance. It tells us that, although bariatric surgery is associated with improved outcomes on a large population level, time has come that we should personalize this treatment modality more for patients with severe obesity by also taking cardiac performance into account and that we should focus more on the actual burden of visceral adiposity rather than 'general obesity' based on BMI.

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Abstract

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BACKGROUND

Studies with short-term follow-up have demonstrated favorable effects of weight loss (WL) on the heart, but little information is available regarding long-term effects or effects of visceral fat reduction.

OBJECTIVES

The purpose of this study was to evaluate the effects of long-term WL following bariatric surgery on cardiac structure, function, ventricular interaction, and body composition, including epicardial adipose thickness and abdominal visceral adipose tissue (VAT).

METHODS

A total of 213 obese patients underwent echocardiography before and >180 days following bariatric surgery. Abdominal VAT area was measured by computed tomography in 52 of these patients.

RESULTS

After 5.3 years (IQR: 2.9-7.9 years), body mass index (BMI) decreased by 22%, with favorable reductions in blood pressure, fasting glucose, and left ventricular (LV) remodeling in the full sample. In the subgroup of patients with abdominal computed tomography, VAT area decreased by 30%. In all subjects, epicardial adipose thickness was reduced by 14% (both $P < 0.0001$) in tandem with reductions in ventricular interdependence. LV and right ventricular longitudinal strain improved following WL, but left atrial (LA) strain deteriorated, while LA volume and estimated LA pressures increased. In subgroup analysis, LV wall thickness and strain correlated more strongly with VAT than BMI at baseline, and reductions in LV mass following surgery were correlated with decreases in VAT, but not BMI.

CONCLUSIONS

In this observational study, weight loss following bariatric surgery was associated with epicardial fat reduction, reduced ventricular interaction, LV reverse remodeling, and improved longitudinal biventricular mechanics, but LA myopathy and hemodynamic congestion still progressed. Reduction in visceral fat was associated with favorable cardiac effects, suggesting this might be a key target of WL interventions.

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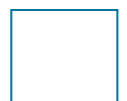
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