CONCENTRIC LV REMODELING IS RELATED TO DECREASED CIRCUMFERENTIAL STRAIN AND STRAIN RATE AFTER EXERCISE IN OBESE PATIENTS.

ACC Poster Contributions
Georgia World Congress Center, Hall B5
Monday, March 15, 2010, 3:30 p.m.-4:30 p.m.

Session Title: Cardiomyopathies Basic and Clinical
Abstract Category: Cardiomyopathies/Myocarditis/Pericardial Disease
Presentation Number: 1176-43

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Background: Obese patients have exercise intolerance and increased risk of developing heart failure. Concentric LV remodeling, frequently noted in severe obesity, is associated with subclinical myocardial dysfunction. The relation of LV remodeling and myocardial function during exercise has not been clarified.

Methods: From a prospective registry evaluating the long term effects of gastric bypass surgery (GBS), 30 GBS and 34 reference, diet treated subjects were seen at 5 year follow up. For the entire group, mean age was 53 and mean BMI 39. All subjects underwent a modified Bruce treadmill test. 2-D echo studies were performed before and immediately after exercise. Peak circumferential systolic strain (SS), systolic strain rate (SSR) and early diastolic strain rate (DSR) were measured in short axis images at mid-LV level using Vector Velocity Imaging™. Strain and strain rate were averaged across all segments. LV geometry was determined using LV mass/end-diastolic volume ratio.

Results: Mean exercise capacity was 8.2 METs. LV mass was 186.2±61.1 g and LV mass/volume ratio was 1.79±0.50 g/ml. Peak SS decreased significantly from -21.7±6.7 at rest to -16.1±7.4% after exercise (p<0.001), while SSR and DSR did not change significantly. There was a significant correlation between LV mass/vol ratio and the change in SSR with exercise (r=0.40, p=0.001). Increased LV mass/vol also was associated with a tendency of decline in SS after exercise (r=0.21, p=0.09). These associations were significant after adjustment for age, sex, BMI, HTN, diabetes, exercise time and mean blood pressure (for change in SSR, p=0.002 and for change in SS, p=0.015). In contrast, no relation between LV mass/vol ratio and DSR was seen (p=0.29). These relationships were not different whether the participants were in the reference diet treated or post-GBS.

Conclusion: More severe LV concentric remodeling in obese subjects is associated with decline in circumferential systolic strain and strain rate after exercise. These findings underscore the importance of LV remodeling in obesity and its effect on LV function during exercise. Finally, these findings point to possible mechanisms of exercise intolerance in this common condition.