Body Composition Predictors of Trabecular and Cortical Microarchitecture in Adolescents with Morbid Obesity

Monday 12:45-1:15 PM | PD219-SD-MOB5 | PD Community, Learning Center Station #5

PURPOSE

Obesity was believed to be protective for bone health; however, recent studies have shown that childhood obesity is associated with higher incidence of forearm fractures. The purpose of our study was to determine predictors of trabecular and cortical microarchitecture of the distal radius in adolescents with morbid obesity. We hypothesized that lean mass would be positively, and visceral adiposity negatively, associated with bone microarchitecture in this population.

METHOD AND MATERIALS

Our study was IRB approved and HIPAA compliant. Written informed consent was obtained. We recruited 11 adolescents (mean age: 16±2 years, 9 f, 2 m – recruitment is ongoing) with morbid obesity (mean BMI:42±6 kg/m2). 3D HR-pQCT of the distal radius was performed with an isotropic voxel size of 82 µm (Xtreme CT, Scanco Medical, Basserdorf, Switzerland) to assess cortical and trabecular microarchitecture, including individual trabecular segmentation (ITS), which models the trabecular region as a lattice of individual plates and rods. Body composition, including estimated visceral adipose tissue (VAT) mass was determined by DXA (Discovery A; Hologic, Bedford, MA, USA). Non-parametric linear regression analysis was performed to determine body composition predictors of bone microarchitecture.

RESULTS

Two subjects were unable to undergo HR-pQCT due to body size. BMI was positively associated with cortical thickness (r=0.82, p=0.007) and cortical area (r=0.68, p=0.04). Lean mass was positively associated with trabecular density and volume (r=0.77, p=0.02 for both correlations), and measures of trabecular integrity by ITS (r=0.72 to 0.83, p=0.04 to 0.003). VAT mass was positively associated with cortical porosity (r=0.73, p=0.02).

CONCLUSION

Lean mass is a positive predictor of measures of trabecular integrity, whereas VAT is a negative predictor of cortical integrity in adolescents with morbid obesity.

CLINICAL RELEVANCE/APPLICATION

High VAT mass and low lean mass are risk factors for skeletal dysregulation in adolescents with morbid obesity.