MRI measures of bone in Duchenne muscular dystrophy


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Boys with Duchenne muscular dystrophy (DMD) have an increased incidence of fracture and low bone mineral density (BMD). Previous studies of bone in DMD have utilized dual-emission X-ray absorptiometry (DXA); however, this technique yields monoplanar bone density. Magnetic resonance imaging (MRI) techniques on the other hand provide 3-dimensional structural information regarding bone structure and composition.

Subjects for this cross-sectional analysis were drawn from the multicenter ImagingDMD study and included 14 boys with DMD (age 7–11 years, mean 9.3 ± 1.6 years) and 7 control subjects (age 7–11 years, mean 9.4 ± 1.5 years). MRI T1-weighted images taken at the mid-tibia were used to determine the following bone volumetric measures: overall bone cross-sectional area (CSA), cortical bone cross-sectional area (cCSA) and trabecular bone cross-sectional area (tCSA). Mid-tibia trabecular bone composition was assessed using the same T1-weighted cross-sectional image with and without fat suppression to determine average trabecular bone fat signal intensity.

Boys with DMD had lower mean tibial CSA compared to controls (p < 0.001), lower mean cCSA (p = 0.0005) and lower mean tCSA (p = .03). The mean tibial trabecular fat content was not significantly different between the two groups (p = 0.38).

This study demonstrates that boys with DMD have significant differences in measures of bone cross-sectional area, affecting both the cortical and trabecular bone, with the reduction in cortical bone being the most marked (~30% reduced). There is a clear need to better characterize the abnormalities in bone of boys with DMD in order to improve both direct medical management of osteoporosis in this population as well as inform the development of clinical trials to address this issue.

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