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Oral Abstract

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Sex-specific effects of repetitive loading on bone mass and geometry during growth

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The sex-specific effects of loading on bone mass and geometry were investigated throughout puberty in 80 competitive tennis players (44 boys), mean age 13.7 years (9.2-18.9 years). All players had their dominant and nondominant humeri scanned by MRI. Total bone area (ToA), medullary area (MedA), and cortical area (CoA) were determined at the mid (40-50%) and distal humerus (60-70%). Humeral BMC was derived from the whole body DXA scan. Pubertal status was self-assessed using Tanner stages (TS). Boys and girls started playing at the same age (7 years) and had similar training volume (14.0 vs 13.4 hours/week, respectively).

In boys and girls, BMC, ToA and CoA were greater on the dominant relative to non-dominant side from TS1 to TS5 (+5.9-36.9%, $p<0.05$). In contrast, MedA was smaller on the dominant side, at the distal humerus only, from TS2 in girls and TS1 in boys. At the mid humerus, no side-to-side difference in MedA was found, although girls tended to show medullary contraction on the dominant side.

Sex differences in bone response to loading were investigated by comparing data on the dominant side (expressed as a percentage of the nondominant side) between boys and girls (figure). The largest sex differences in BMC, ToA and MedA were observed at TS2, with side-to-side differences being approximately twofold greater in boys ($p<0.05$). Repetitive loading induces significant bone accretion and bone enlargement from pre-puberty in both sexes, but the onset of puberty is associated with a greater skeletal response to loading in boys than in girls.

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