Is Pre-Injury Leg Length Discrepancy A Risk Factor For Anterior Cruciate Ligament Injury In The Skeletally Immature Athlete?

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INTRODUCTION


OBJECTIVES

We hypothesize that the intrinsic risk factors leg length discrepancy (LLD) and lateral mechanical axis deviation (MAD) are not uncommon in skeletally immature athletes that suffered an acute ACL injury.

METHODS

We prospectively obtained full-length hip-to-ankle radiographs in a consecutive cohort of skeletally immature athletes that suffered an acute ACL injury and underwent surgical reconstruction. Using computer software, we measured standing hip to ankle radiographs for LLD including the individual segments (femur length and tibia length). We also measured coronal mechanical alignment of the entire leg [MAD, mechanical tibio-femoral angle (mTFA)] and the segments [mechanical lateral distal femoral angle (mL DFA) and medial proximal tibial angle (MPTA)].

RESULTS

A total of 108 pediatric patients (mean age 13.4, range 7-14 years) were included (79 boys and 29 girls). Fifty (46.3%) patients had a LLD of ≥5 mm of which 33 (66%) sustained ACL injury of their shorter leg and 17 (34%) of their longer leg. Twelve (11.1%) patients had a LLD of ≥10 mm of which 9 (75%) had ACL injury of the shorter leg and 3 (25%) of their longer leg. Thirty-five (32.4%) and thirty-four (31.5%) patients had ≥5 mm of length discrepancy between the femurs and tibias, respectively. Three (2.8%) and nine (8.3%) patients had ≥10 mm of length discrepancy between the femurs and tibias, respectively. When comparing the coronal alignment of the injured leg with the contralateral leg, it was noted that the MAD was displaced 6.6±9.3mm lateral (valgus) with ACL injury vs. 1.5±8.1mm lateral without injury (p<0.001). The mTFA and mL DFA of the injured leg had a greater valgus alignment than the non-injury leg (2.4°±2.7 and 85.2°±2.2 vs. 0.9°±2.3 and 86.1°±1.82; p<0.001). Stratifying results by gender, similar findings were seen when comparing the leg with ACL injury versus the leg without ACL injury for MAD (boys: 6.9±9.2mm lateral vs. 1.7±8.3mm lateral, respectively, p=0.001; girls: 6.0±9.7mm lateral vs. 0.9±7.8mm lateral, respectively, p=0.031). Pelvic width was larger in girls when compared to boys (166±17mm vs. 155±18mm, respectively, p=0.005).

CONCLUSIONS

A LLD≥5mm was present in 46% of our pediatric ACL patients (the majority sustained the ACL tear in the shorter leg). This high rate suggests a possible association of mild LLD with ACL tear in the active immature athlete.

CONCLUSIONS

Growth disturbance is a major concern when surgically treating pediatric patients with ACL injury. Recognizing these abnormalities preoperatively is crucial to adequately evaluate for growth disturbance (LLD and/or Malalignment) following ACL reconstruction. Strategies to prevent ACL injury should also consider LLD of the lower limb.