Gender difference of the femoral kinematics axis location and its relation to anterior cruciate ligament injury: a 3D-CT study.

Abstract:
The variation of distal femur morphology has been often reported, especially in relation to ACL injury. However, it remains unknown how morphological differences affect knee kinematics and ACL function. The location of the transcondylar axis, a common anatomical reference line, may be a significant aspect of morphological variation. It was hypothesized that the location of this axis would be different between genders, and between ACL-injured and non-injured subjects. 3D CT scans of contralateral healthy femurs in 38 unilateral soft tissue injured patients (20 men/18 women, 26 ACL injury/12 non-ACL injury (7 with PCL injuries and 5 with medial meniscus root tears)) were analyzed three-dimensionally. Condyle offset was calculated as the distance between the transcondylar axis and the anatomical axis of the femur. Condyle offset ratio (COR) was then calculated by dividing the condyle offset by the condyle radius. Gender and ACL-injured and non-injured group differences were assessed. Larger COR was found in women, 1.10 ± 0.14, than men, 0.96 ± 0.08. In women, the ACL-injured group had significantly larger COR than the non-ACL injury group, but no difference was found in men. COR is a unique morphological feature which is measureable from 3D CT. COR is larger in women, and could be a possible risk indicator for ACL injury in the female population.