

論文名 : Three-dimensional in vivo dynamic motion analysis of anterior cruciate ligament-deficient knees during squatting using geometric center axis of the femur

(前十字靭帯不全膝におけるスクワット運動の大腿骨 geometric center axis を用いた三次元動的運動解析)

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Background Anterior cruciate ligament (ACL) injury often leads to symptoms of instability, which may cause meniscus injury, osteochondral lesions, and degenerative changes. For thorough evaluation of the effects of abnormal motion of ACL-deficient (ACLD) knees on the meniscus and articular cartilage, it is necessary to assess tibiofemoral motion in the medial and lateral compartments separately. Our aim was to determine if in vivo three-dimensional (3D) dynamic motion of ACLD knees differs from that of contralateral uninjured knees by assessing knee motion in the medial and lateral compartments respectively.

Methods A total of 22 patients with an isolated ACL-injured knee were examined. 3D to two-dimensional registration was used to determine 3D knee motion during squatting from full knee extension to full flexion for both ACLD and contralateral uninjured knees. The knee motion was evaluated by the movement of the geometric center axis of the femur projected onto the tibial axial plane.

Results In ACLD knees the lateral femoral condyle was located significantly more posteriorly during nearly full extension than in contralateral uninjured knees. The range of anteroposterior translation of the medial femoral condyle was significantly greater than those of contralateral uninjured knees.

Almost all of the contralateral uninjured knees demonstrated medial pivot motion, while the ACLD knees showed higher variance.

Conclusions The ACLD knees exhibited a motion pattern different from those of contralateral uninjured knees with higher variance. During nearly full extension of the ACLD knees, the lateral femoral condyle translated posteriorly and the screw-home movement seemed to be impaired. The ACL might have an important role in maintaining normal knee function, especially during the early flexion phase. The larger range of anteroposterior translation of the medial femoral condyle in ACLD knees may be associated with a risk of secondary meniscal injury and degenerative change in the articular cartilage.