Computational Simulation of the fatigue-related anterior cruciate ligament injury of the knee during golf swing

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A golf-related Knee injury can be linked with excessive golf play or practice because such over-use by repetitive golf swing motions can increase damage accumulation to the ACL bundles [1]. In this study, joint angular rotations, forces, and moments, as well as the forces and strains on the ACL of the target-side knee joint, were investigated for ten professional golfers using the multi-body lower extremity model [2]. The fatigue life of the ACL was also predicted by assuming the estimated ACL force as a cyclic load. The result indicates that the maximum ACL force (841.8±437) N and strain (11.4±4.4 %) were resulted within a short time just after ball-impact in the follow through phase. The estimated fatigue life of ACL in target side knee may occur few thousands, if not lower than several thousands of repeated golf swing motion.

Fig. 1. A) Schematic diagram modeling technique to estimate ACL load, B) predicted maximum ACL load and strain values, C) Estimated fatigue life of human MCL and extensor digitorum tendon