The effect of knee flexion and rotation on the tibial tuberosity-trochlear groove distance

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Author(s) Camathias, Carlo; Pagenstert, Geert; Stutz, Ulrich; Barg, Alexej; Muller-Gerbl, Magdalena; Nowakowski, Andrej M.
Author(s) at UniBasel Müller-Gerbl, Magdalena ;
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PURPOSE: The purpose was to measure the effect of flexion and additional rotation of the femur relative to the tibia on the tuberosity-trochlear groove distance (TT-TG) in the same subject in 20 cadaveric knees joint. METHODS: In 20 human adult cadavers, formal fixed knees (age: 81.9 years, SD 12.3; 10 female) CT scans were performed in extension and 30 degrees of flexion as well as in neutral, maximal possible internal (IR), and external rotation (ER). On superimposed CT scan images, TT-TG was measured in each position. TT-TG measurements were correlated in all knee positions. RESULTS: TT-TG in full extension/neutral rotation was 7.8 mm (SD 3.4, range, 2.4-15.3). TT-TG in full extension and IR was significantly lower, and TT-TG in full extension and ER was significantly higher than in neutral rotation (5.4 +/- 2.3 vs. 10.9 +/- 4.8 mm; P > 0.001). IR and ER varied between 1.0 degrees -7.6 degrees and 0.2 degrees -9.2 degrees , respectively. TT-TG in 30 degrees flexion/neutral rotation was 3.9 mm (SD 1.8, range, 1.3-7.8), which was significantly lower than in full extension and neutral rotation (P > 0.001). TT-TG in 30 degrees flexion and IR was significantly lower, and TT-TG in 30 degrees flexion and ER was significantly higher than values obtained in neutral rotation (2.7 +/- 1.2 vs. 6.5 +/- 3.4 mm; P > 0.001). IR and ER in 30 degrees flexion varied between 0.6 degrees -10.7 degrees and 1.9 degrees -13.0 degrees , respectively. CONCLUSION: Flexion as well as rotation of the knee joint significantly alters the TT-TG. These results may have wider clinical relevance in assessing TT-TG and further decisions based on it.
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