別紙様式３（論文博士申請者用）

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学位論文題名

Differences in gait kinetics and kinematics between patients with rotating hinge knee and cruciate-retaining prostheses: A cross-sectional study

ローテイティングヒンジ型人工膝関節と後十字靭帯温存型人工膝関節置換術後患者の歩行中の運動学・運動力学の違い

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[Purpose] Total knee arthroplasty (TKA) is a common surgical treatment for severe osteoarthritis of the knee joint (KOA). The implants used in TKA differ based on the treatment need. Rotating hinge knee (RHK) prostheses are often used in primary total knee arthroplasty (TKA); however, the biomechanics resulting from this treatment remain unexplored. This cross-sectional study assessed the efficacy of primary TKA using RHK or other prosthetic types by comparing patient data on gait kinetics and kinematics. We hypothesized that these participants would have similar knee joint kinetics and kinematics as participants who underwent primary TKA with a cruciate-retaining (CR) prosthesis. [Participants and Methods] Thirty-five participants were assigned to the following groups: RHK (n=7); cruciate-retaining prosthesis (CR) (n=7); untreated osteoarthritis (n=10); and young adults as a reference group (n=9). All participants were assessed at a comfortable walking pace using a three-dimensional motion analysis system (Vicon Nexus; Oxford Metrics, London, UK) with 10 cameras operating at a sampling rate of 100 Hz. The ground reaction force was captured using two force plates (Kisler Japan, Tokyo, Japan). The three-dimensional data were imported into the Software for Interactive Musculoskeletal Modeling (SIMM; MusculoGraphics, Santa Rosa, CA, USA). The spatiotemporal parameters, knee joint angles, and knee adduction moment (KAM) in the stance phase were calculated. Participant's data on mechanical and spatiotemporal parameters were analyzed using analysis of variance and post-hoc Tukey's tests. [Results] The postoperative course duration of the RHK group was not significantly longer than that of the CR group. The knee varus angle and adduction moment of the RHK group were significantly smaller than those of the untreated osteoarthritis group. Gait kinetics and kinematics were not different between the RHK and CR groups. [Conclusion] Participants who underwent primary TKA with a RHK prosthesis had worse preoperative conditions and demonstrated similar postoperative gait as participants who underwent TKA with other prostheses types. Our findings may be used to tailor rehabilitation for participants undergoing TKA with RHK implants.