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Biomechanics of Ceramic on Ceramic vs. Ceramic on Xlpe Total Hip Arthroplasties During Gait

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Abstract : In vitro measurements are widely used in order to predict THAs wear rate implementing gait kinematic and kinetic parameters. Clinical tests of materials and designs are crucial to prove the accuracy and validate such measurements. The purpose of this study is to examine the affection of THA gait kinematics and kinetics on wear during gait, the essential functional activity of humans, by comparing in vivo gait data to in vitro results. Our study hypothesis is that both implants will present the same hip joint kinematics and kinetics during gait. 127 unilateral primary cementless total hip arthroplasties were included in the research. Independent t-tests were used to identify a statistically significant difference in kinetic and kinematic data extracted from 3D gait analysis. No statistically significant differences observed at mean peak abduction, flexion and extension moments between the two groups (P.abduction= 0,125, P.flexion= 0,218, P.extension= 0,082). The kinematic measurements show no statistically significant differences too (Prom flexion-extension= 0,687, Prom abduction-adduction= 0,679). THA kinematics and kinetics during gait are important biomechanical parameters directly associated with implants wear. In vitro studies report less wear in CoC than CoXLPE when tested with the same gait cycle kinematic protocol. Our findings confirm that both implants behave identically in terms of kinematics in the clinical environment, thus strengthening in vitro results of CoC advantage. Correlated to all other significant factors that affect THA wear could address in a complete prism the wear on CoC and CoXLPE.

Keywords : total hip arthroplasty biomechanics, THA gait analysis, ceramic on ceramic kinematics, ceramic on XLPE kinetics, total hip replacement wear
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