THE IMPACT OF SITTING CONFIGURATION ON THE HIP JOINT REACTION FORCE AND HIP FLEXION ANGLE

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Summary: The kneeling chair configuration results in a 50% reduction of hip joint reaction force as well as a significantly lower hip flexion angle compared with a simple chair and especially a car seat.

Introduction: Deep seated sitting has been reported to produce pain in mechanical hip diseases, such as femoroacetabular impingement (FAI). Unlike lower back diseases, the effect of different sitting configurations on hip biomechanics has not yet been investigated. Since prolonged sitting is often an important part of the daily work and leisure activities of FAI patients, we examined the impact of 3 different sitting configurations on the hip joint reaction force and the hip flexion angle.

Methodology: Three musculoskeletal sitting models were built to simulate an average simple chair, car seat and kneeling chair configuration. A virtual average male Caucasian subject (1.75 m, 74 kg) was seated in the three distinct configurations and both static hip joint reaction force and hip flexion angle were measured.

Results: The observed median HJRF and hip flexion angle, respectively, was 124 N and 63° for the simple chair, 132 N and 78° for the car seat and 59 N and 51° for the kneeling chair.

Discussion: A relative reduction of 50% in HJRF was observed in the kneeling chair configuration compared to the car seat and simple chair. More importantly, the hip flexion angle was significantly lower in the kneeling chair configuration and as such did not reach threshold values for femoroacetabular conflict. In conclusion, the kneeling chair appears to hold the greatest potential as ergonomic sitting configuration for the hip joint in case of FAI.