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Sexual Activity after Total Hip Arthroplasty: A Motion Capture Study

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Introduction

Many patients wonder about the risks related to sexual activity after THA, but this issue remains rarely discussed between patients and surgeons. To date, the relative risk of prosthetic or bony impingement and joint instability during sexual activities after THA has never been objectively evaluated and is thus unknown. Hip range of motion (ROM) necessary to perform sexual positions has also never been quantified.

Objectives

Our goal was to obtain realistic motion data for several common sexual positions and to evaluate relative risk of impingement and joint instability during their practice. We therefore conducted an in-vivo study using optical motion capture and magnetic resonance imaging (MRI). The data obtained were used for computer simulations of prosthetic hip joint 3D models.

Methods

Motion capture and MRI was carried out on 2 healthy volunteers (1 female, 1 male). Motion of the subjects was acquired during 12 common sexual positions. The hip joint kinematics was computed from the recorded markers trajectories using a validated optimized fitting algorithm (accuracy: translational error ≈ 0.5 mm, rotational error $< 3^\circ$) which accounted for skin motion artifacts and patient-specific anatomical constraints. The resulting computed motions were applied to the subject's hip joint 3D models reconstructed from their MRI data. Hip ROM were determined at each point of the motion independently of the major anatomical planes, thanks to two bone coordinate systems (1 for the femur and 1 for the pelvis).

3D models of prosthetic hip joints (pelvis, proximal femur, cup, stem, head) were developed based on variations of acetabular cup's inclination (40° , 45° , 60°) and anteversion (0° , 15° , 30°) parameters, resulting in a total of 9 different implant configurations. Femoral anteversion remained fixed and determined as "neutral" with the stem being parallel to the posterior cortex of the femoral neck. Motion capture data of sexual activity were applied to all implant configurations.

While visualizing the prosthetic models in motion, a collision detection algorithm was used to locate abnormal contacts between both bony and prosthetic components. Moreover, femoral head translations (subluxation) were computed to evaluate the joint congruence.

Results

Sexual positions for women required intensive flexion (4 positions with $> 95^\circ$), abduction (4 positions with $> 32^\circ$) and mostly external rotation. For men positions, flexion and abduction remained in the normal range, but external rotation was dominant for all motions. Prosthetic impingements occurred during one or more of the sexual positions for women at 6 cup positions (no collision at cups $45^\circ/30^\circ$, $60^\circ/15^\circ$, $60^\circ/30^\circ$). Impingements were observed in the 4 positions requiring the highest hip flexion. No bony impingements were detected. For men, impingements remained scarce except for 1 position where bony impingements were observed at all cup positions. Subluxation was posterior for women, while it was anterior for men.

Conclusion

Sexual positions for women require intensive hip ROM, whereas sexual positions for men require less mobility. Sexual activity could expose the patients after THA, in particular the women, to bony or prosthetic impingement associated with joint instability. This study objectively indicates that 4 positions for women and 1 position for men could be potentially at risk after THA and should be hence avoided. This information could be useful for surgeons in order to provide specific instructions to patient's inquiries.