

# SSOT 2014 Paper Submission

## Risk Assessment of Sexual Activity after Total Hip Arthroplasty (THA)

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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 impingement and joint instability during sexual activities after THA has never been objectively evaluated. Hip range of motion (ROM) necessary to perform sexual positions is also unknown. Our goal was to fill this lack using motion capture and computer simulations of prosthetic models.

### Methods

Motion capture and MRI was performed on 2 healthy volunteers (1 female, 1 male). Motion of the subjects was acquired during 12 common sexual positions. The hip joint kinematics and ROM were computed from the markers trajectories using a validated fitting algorithm (accuracy: translational error  $\approx 0.5\text{mm}$ , rotational error  $< 3^\circ$ ) taking into account the patient's anatomy reconstructed from their MRI data.

3D models of prosthetic hips (pelvis, femur, implants) were developed based on variations of acetabular cup's inclination ( $40^\circ$ ,  $45^\circ$ ,  $60^\circ$ ) and anteversion ( $0^\circ$ ,  $15^\circ$ ,  $30^\circ$ ) parameters, resulting in 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 configurations.

During simulation, a collision detection algorithm was used to locate impingements between both bony and prosthetic components. Femoral head translations (subluxation) were also computed to evaluate the joint congruence.

### Results

Sexual positions for women required intensive flexion (4 positions with  $> 95^\circ$ ) and abduction (4 positions with  $> 32^\circ$ ). For men, 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. 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 activity could expose the patients after THA to 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. This information could be useful for surgeons in order to provide specific instructions to patient's inquiries.