

10<sup>th</sup> International Conference on

# Orthopedics, Trauma and Rheumatology

March 08-09, 2018 London, UK



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### A kinematic analysis in posterior-stabilized total knee arthroplasty during activities of daily living

**Background & Aim:** Stair stepping motion and standing and sitting motion from a chair are important in daily living, similar to gait. It is important to understand *in vivo* kinematics of patient's with total knee arthroplasty during stair-stepping and standing and sitting motion from chair. The purpose of this analysis was to estimate *in vivo* knee motion in stair stepping and standing and sitting motion from a chair, and determine if this unique knee prosthesis function as designed.

**Methods:** A total of 20 patients implanted with Bi-Surface PS were assessed in stair-stepping. 15 patients were assessed in standing and sitting from chair. The Bi-surface PS knee is a posterior-cruciate substitute prosthesis with a unique ball-and-socket joint in the mid-posterior portion of the femoral and tibial components. Patients were examined during stair stepping and standing and sitting motion from a chair motion using a 2-dimensional to 3-dimensional registration technique.

**Results:** In stair-stepping, the kinematic pattern in step up was a medial pivot, in which the level of antero-posterior translation was very small. In step down, the kinematic pattern was neither a pivot shift nor a rollback. From minimum to maximum flexion, anterior femoral translation occurred slightly. In standing and sitting from a chair, from minimum to 30° knee flexion, anterior femoral translation occurred slightly. From 30° knee flexion to maximum flexion, the kinematic pattern was a medial pivot and rollback.

**Conclusion:** It became clear in this study that the joint's stability during stair-stepping was affected by the design of the femorotibial joint rather than Post/Cam engagement or the Ball & Socket joint. In standing and sitting from a chair, the unique knee prosthesis functioned as designed.

### Biography

Takatomo Mine is currently an Associate Professor in the Department of Orthopedic Surgery, Yamaguchi University. He is the Director of Orthopedic Surgery and Rheumatology at Kanmon Medical Center, Yamaguchi and also a Member of various associations. He has published around 35 articles in various international journals in the field of orthopedics.

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