

Dataset: Dynamic acetabular cup orientation in fast and slow walking total hip replacement patients: raw motion data, processed cup angles and statistical analyses.

Method document: Patient selection and pelvic motion angle derivation

Original gait data collection

- Raw kinematic gait data was acquired at Leeds Biomedical Research Centre as a part of the LifeLongJoints (LLJ) cohort.
- In the original cohort, 132 total hip replacement patients undertook 3-5 walking trials, at self-selected speed, along a 10-metre walkway.
- Gait data was captured using a ten camera Vicon system (Oxford Metrics, UK) and the CAST marker set was used to track lower limb kinematics²³.

Patient selection and data extraction

- From the LLJ cohort, data for 39 unilateral THR patients were selected. Patients were grouped into fast walking (13 males, seven females) and slow walking (nine males, 10 females), where speed was defined by one standard deviation above ($\geq 1.26 \text{ ms}^{-1}$) or below ($\leq 0.95 \text{ m*s}^{-1}$) the cohort mean respectively.
- Pelvic movement components were derived for each patient using Visual 3D (C-Motion, Inc., US).
- The components were defined as
 - pelvic tilt (rotation around a medial-lateral axis),
 - obliquity (rotation around an anterior-posterior axis),
 - and internal-external rotation (rotation around superior-inferior axis).

Pelvic angle data through the gait cycle for the two groups of patients is illustrated in Figure 1.

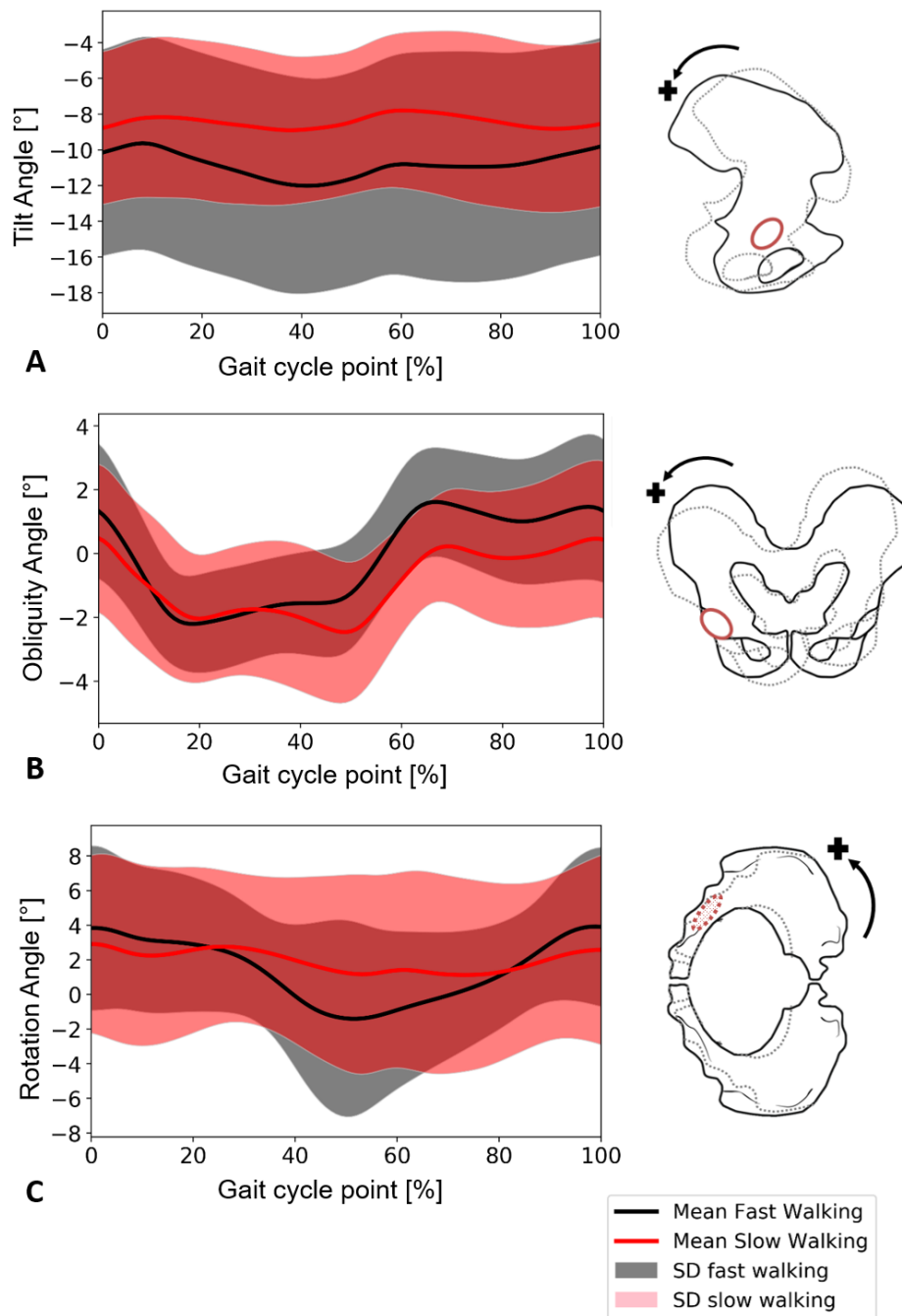


Figure 1: Derived pelvic movement data during gait for the fast-walking and slow-walking groups. The data are normalised to the right hip according to right-hand rule. (A) Tilt angle around medial-lateral axis (where posterior tilt is positive) – sagittal plane. (B) Obliquity angle around anterior-posterior axis (positive obliquity had downward direction) – coronal plane. (C) Rotation around superior-inferior axis (where internal rotation is positive) – transverse plane.