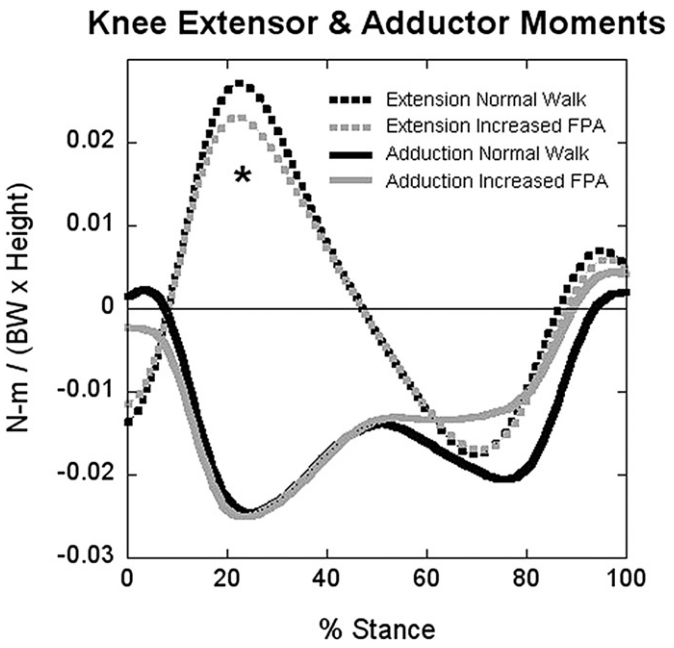
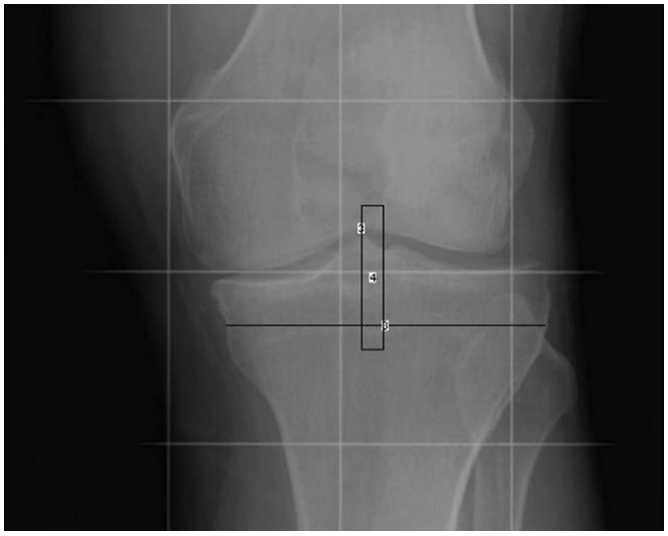


Figure 1. These data are for 6 of 10 subjects who demonstrated reduced extensor moment when walking with increased FPA. The extensor moment was significantly smaller for the FPA condition while no differences were noted for the adduction moment. * = $p < 0.05$.

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LATERAL TIBIO-FEMORAL SHIFT RELATED TO MEDIAL KNEE OSTEOARTHRITIS

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Purpose: Medial knee osteoarthritis (MKOA) has been shown to be related to malalignment of the knee joint segments with several radiographic measurements used to quantify the abnormality. Radiographic observations of a lateral tibial shift in subjects with MKOA has led the authors to hypothesize that this finding is more prevalent in MKOA than normal controls and is associated with MKOA measurable gait parameters.
Methods: 90 subjects (69F 21M, Age 60±8, BMI 28.3±4.0) with radiographic and symptomatic medial knee OA (K-L grade 2-3, ambulatory pain >30 mm on a 100 mm VAS) were compared to 24 (18F 6M) age (59±10) and BMI (28.8±8.3) matched controls with no knee pain (K-L grade 0-1). Full limb mechanical axis and AP X-rays of the ankles were obtained. The tibial lateral shift (*image 1*), defined as the distance between the center of the intercondylar notch of the femur and midpoint of the tibial plateau, was measured, using Image J software (US NIH, Bethesda, MD, http://rsbweb.nih.gov/ij/). Subjects underwent gait analyses using an optoelectronic camera system and multi-component force plate. Subjects walked at their normal speed, and comparisons were performed after matching for speed. The peak external knee AddM (%body weight * height, %BW*Ht) was calculated at the knee and used as the primary endpoint. Paired t-tests were used to compare group differences. Pearson's correlations were calculated to analyze the relationship between knee moments and the other radiographic parameters with significance set at $p<0.05$.
Results: The mean ± S.D. lateral tibio-femoral shift was 5.18±2.45 mm in the MKOA group compared to 1.5±1.22 mm in the control group ($p<0.01$). Interestingly there was no relationship between the lateral shift and mechanical axis ($r=0.11$, $p=0.23$). There was an apparent relationship between the external knee adduction moment and lateral tibial shift in the MKOA group with greater lateral tibial shift related to greater knee moments ($r=0.46$, $p<0.01$). There was no relationship between knee adduction moments and lateral tibial shift in the control group ($r=0.13$, $p=0.09$).
Conclusions: Lateral tibio-femoral shift is greater in MKOA than in normal controls and is related to increased medial knee loads. These findings suggest that the lateral tibio-femoral shift may be a new radiographic marker for MKOA. Further studies are needed to determine the clinical validity of assessing the tibio-femoral shift.



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ALTERED FOOT PROGRESSION ANGLE GAIT MODIFICATION FOR MEDIAL KNEE JOINT LOAD REDUCTION IN PEOPLE WITH MEDIAL KNEE OSTEOARTHRITIS

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Purposes: To evaluate the immediate effect of varying amounts of foot progression angle (FPA) gait modification on 1) medial knee load, as measured by the external knee adduction moment (KAM) and knee flexion moment (KFM), and 2) knee pain, in individuals with medial knee osteoarthritis (OA). Influences of knee mechanical alignment and WOMAC pain on load-modifying effects of altered FPA were also investigated.
Methods: People with clinical and radiographic medial knee OA were recruited (13F, 9M; age 69.7yrs±9.0; mass 77.9kg±16.5). Standard weight-bearing AP radiographs were used to confirm OA and quantify mechanical knee alignment. Participants underwent 3-D gait analysis along a 10m walkway (8-camera VICON, 3 AMTI force plates) using the standard VICON lower body Plug-In-Gait marker set. A repeated measures experimental study was conducted with six gait conditions (5 trials each). Following natural walking trials, a physiotherapist instructed participants to alter FPA of the symptomatic limb toward the toe-in and toe-out directions. Real-time biofeedback of FPA was provided to participants via a projector screen placed at the end of the walkway. Biofeedback comprised of a protractor-like display consisting of an arrow indicating their FPA during stance and a shaded target area for each gait modification condition. Gait modification conditions were recorded at natural gait speed in random order, where participants attempted the following FPAs: 10° toe-in; 0° FPA; 10° toe-out; 20° toe-out; 30° toe-out. Knee pain during each condition was evaluated via an 11-point numeric rating scale. Measures of medial knee load, the early and late stance KAM peaks, KAM impulse, and peak KFM, were primary outcomes. Effects of the modification on KAM were evaluated using linear mixed models, with participants as the random factor and FPA during foot flat as the fixed factor. Interactions with the independent variable were used to assess contributions of mechanical alignment and WOMAC pain to the extent of load-modification. Change in pain was evaluated using repeated measures analysis of variance.
Results: Participants performed the toe-in gait conditions more accurately than the toe-out conditions (gait data shown in Table 1). A dose-response