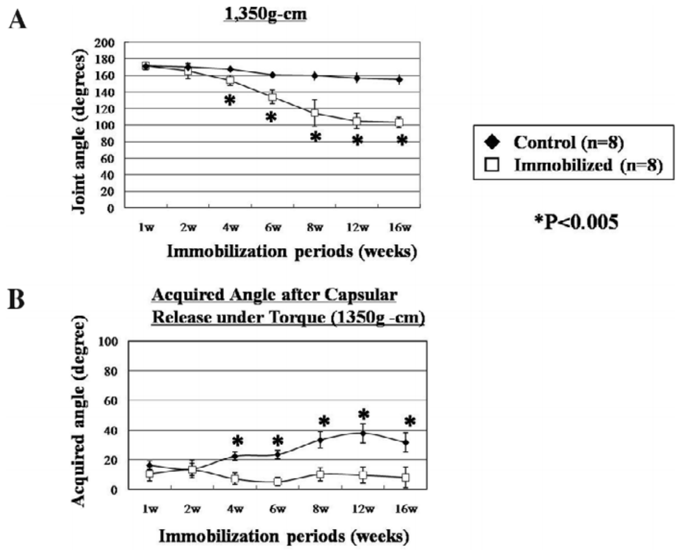

Figure 2

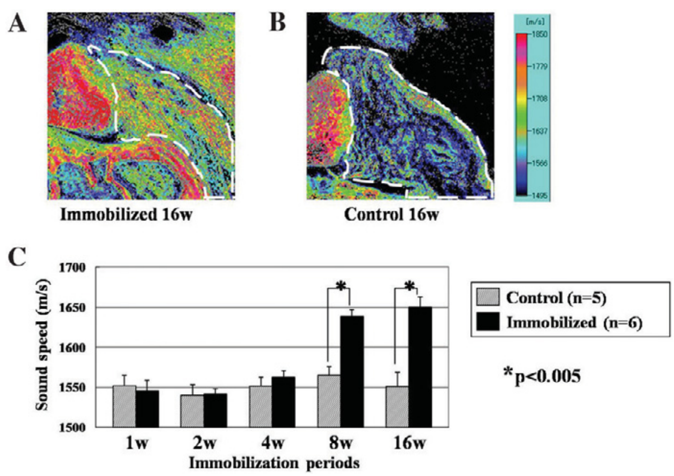

Figure 3

capsule, the acquired angle in the immobilized group was significantly greater than in the control group after 4 weeks and became plateau after 8 weeks (Figure 2). Sound speed of the posterior capsule detected by SAM was increased compared to the control group after 8 weeks of immobilization (Figure 3).

Conclusions: Arthrogenic joint contracture develops at the early stage of immobilization and progresses over time. Structural changes of the posterior capsule were one of the main causes of joint contracture.

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GROSS FEMORAL ROTATION MODELLED USING ACTIVE SHAPE MODELS

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Purpose: Active shape models (ASM) can characterize and quantify the shape of the femur from radiographs or DXA scans. They have potential to identify people at increased risk of hip fracture in osteoporosis or requiring a total hip replacement in osteoarthritis (OA). However like any 2D image, these are sensitive to changes in 3D positioning. The aim of this study was to determine the effect of gross femoral rotation, an important aspect of patient positioning, on an ASM.

Methods: 10 cadaveric femurs from the anatomy department at the University of Aberdeen were scanned with a GE Lunar iDXA scanner (4 female, 6 male aged 31-75 years). Five femurs had signs of OA. Rice bags were used as a soft-tissue substitute. The femur was fixed in a jig. Initial scans were made at 0° anteversion (femoral neck parallel to the scanner table). Subsequent scans were made at rotations of 5° increments. All femurs

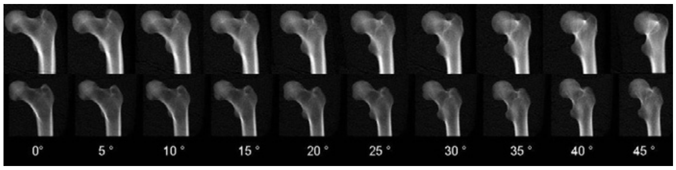

Figure 1

were scanned between 0° and 45°; half were also scanned to -15°. Typical images (0 - 45 degrees) are shown for 2 femurs (Figure 1)

A 29 point ASM was built and scores for the first 5 modes of variation recorded. Advanced Hip Analysis (AHA) using ENCORE software calculated Hip Axis Length (HAL), Neck-Shaft Angle (theta), Cross-sectional moment of inertia (CSMI), neck diameter (d3), distance from the head centre to; section of minimum CSMI along the neck axis (d1), intersection of neck and shaft (d2). Pearson correlation was used to calculate links between rotation and shape, ANOVA to separate the OA and non-OA groups.

Results: All AHA measures were significantly related to rotation (r=0.77-0.95). HAL, d1 and d2 were negatively correlated whilst theta, CSMI and d3 were positively correlated. The first two ASM Modes were significantly correlated with rotation whilst Modes 3, 4 and 5 were independent.

Mode 1 score had a strong relationship with external rotation (r=0.97) reflecting apparent changes in shape of the Lesser Trochanter, femoral neck and greater trochanter (Figure 2). Mode 2 was negatively correlated (r=-0.84) and changes were again consistent with those expected with rotation. The OA group had significantly lower scores at each rotation than the non-OA group ($P<0.05$, Figure 3).

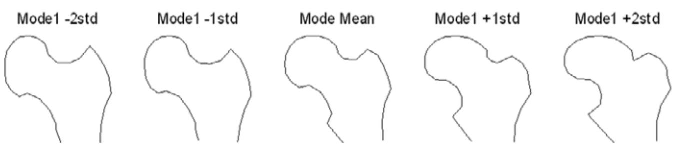

Figure 2

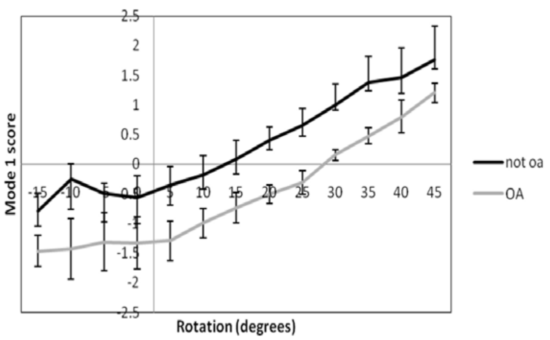

Figure 3

Conclusions: Our results demonstrate that some ASMs and all AHA geometrical measures are affected by femoral rotation, highlighting the need for care in patient positioning. However, only 2 of 5 ASM modes analysed were correlated with rotation, suggesting the possibility of separating rotational changes from an object's intrinsic shape. Further studies are required to investigate positional changes in more detail near the ideal DXA position and to explore aspects of positioning other than rotation, which may allow us to understand and minimize the effects of positioning on Active Shape Models in OA.

Joint Tissue Anabolism and Catabolism

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AUGMENTED EXPRESSION OF SUPRESSOR OF CYTOKINE SIGNALING (SOCS)-3 IN HUMAN PATHOLOGICAL CHONDROCYTES

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Purpose: Osteoarthritis (OA), a degenerative joint disease, and Rheumatoid arthritis (RA), an inflammatory joint disease, are both characterized by