Lateral osteoarthritis of the knee
Etiology based on morphological, anatomical, kinematic and kinetic observations

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Lateral osteoarthritis of the knee
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This thesis aimed to study osteoarthritis (OA) of the knee and its subgroup with lateral wear (valgus knees). Anatomy, kinematics and kinetics (movements and moments) of the hip and knee joint and the sensitivity and specificity of diagnostic procedures were evaluated. Our hypothesis was that there are biomechanical reasons for development of either lateral or medial OA.

The wear pattern of the tibial plateau and the femoral condyles was delineated in 42 patients. The diagnostic accuracy of standing knee radiographs was validated in 34 and reproducibility and validity of the Ahlbäck classification was studied in 48 patients. The Influence of working conditions or gender on the prevalence of uni- or bilateral knee OA was evaluated in 990 patients from 2 hospitals (Varberg and Halmstad) operated during 1985-1994 with knee arthroplasty or proximal tibial osteotomy. For each patient, 3 age- and gender-matched controls were found. Studies of the anatomy of the hip and pelvic regions and the motions and moments in the hip and knee in medial and lateral OA were performed. The detailed kinematics of the knee during active extension in lateral OA were recorded using dynamic radiostereometry (RSA).

In both medial and lateral OA the central part of the tibial plateau showed the most pronounced wear (p<0.001), followed by the anterior part in medial OA (p=0.02) and the posterior part in lateral OA (p=0.001).

In medial OA the observed difference between the 2 radiographic methods was small and acceptable (median; p=0.05; 0-0.5 mm). In lateral OA there was no consistent underestimation, but larger scatter (median; p=0.04; -0.1-1.2 mm) suggesting less precise determination.

The repeatability of the Ahlbäck classification for one observer was fair (kappa: medial: 0.15-0.65; lateral: 0.59-0.76) OA, but between observers it was poor (kappa: 0.1). The validity revealed an acceptable sensitivity in both medial (67-95%) and lateral (43-86%) OA but the specificity was low (medial: 11-67%; lateral: 25-75%).

Farmers (RR: 1.7; p<0.0005) and building workers (RR: 1.4; p=0.047) run increased risk to undergo surgical treatment because of OA of the knee. Unilateral disease was 3.7 times more common among men.

Patients with lateral knee OA had a 14 mm wider pelvis (p=0.001) and those with medial knee OA an 11 mm higher offset (p=0.005). In the gait analysis they showed more outward rotation of the hip (p=0.001) and more inward rotation of the tibia than did patients with medial OA (p=0.001).

In lateral OA, the medial femoral condyle translated 7-8 mm forward with 45° flexion whereas controls translated 4 mm less (p=0.03), without any difference of the lateral femoral condyle.

Conventional radiographs do not give sufficient information for correct grading, especially in lateral OA where the scatter is high. The joint space can often be seen on radiographs despite presence of bone attrition as observed on the preparations. Increased incidence of unilateral disease in men and building workers suggests that this joint disease more commonly originates from previous trauma. Our findings suggest that the occurrence of medial or lateral OA has a biomechanical background originating from pelvis and hip anatomy.

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