Correspondence

Kinetic and kinematic characteristics of gait in patients with medial knee arthrosis

Sir—I read with great interest the article "Kinetic and kinematic characteristics of gait in patients with medial knee arthrosis" by Gök and co-workers (Acta Orthop Scand 2002; 73 (6): 647-652).

13 middle-aged female patients with bilateral early medial gonarthrosis were compared to 13 normal controls. I was surprised to find that both the patients and the normal controls had a valgus (abductor) moment over the knee joints during stance phase (Table 4). Since the Ground Reaction Force (GRF) is directed towards S1 during stance, a varus (adduction) moment over the knee joint is usually found in normal gait and this moment is usually more marked in patients with medial knee arthrosis. To create a valgus moment over the knee joint during gait in knees with no valgus malalignment, the right foot should be placed on the left side of the mid-line during stance to allow the GRF to pass on the lateral side of the center of the knee joint. This results in a gait pattern in which the normal middle-aged women in the control group (and the patients) cross their legs during walking. In my gait studies and clinical practice, I have not seen this gait pattern in normal subjects. I wonder if I have misunderstood the results of this study as they are presented in the article. Have the authors like most others in fact found a varus (adduction) moment over the knee since Morrison first reported this finding in normal gait in 1968? If this is so, the findings of this study confirm current knowledge. If, on the other hand, the authors have found that middle-aged normal women walk with a valgus moment over their knees, I agree with the authors in their conclusion that "longitudinal studies with larger groups are needed".

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Sir—During normal gait, movement of the knee in the coronal plane is negligible. However, a net abductor moment occurs throughout stance that is created primarly by ligamentous forces (Ounpuu 1996). Part of this moment is passive due to the loading of condyles, but also active due to the tension in the iliotibial tract, itself due to continuous activity of the hip abductors (gluteus medius, tensor fasciae latae) during stance (Winter et al. 1996). As for the external moments, there is an external knee adduction moment that is related to the distribution of forces between the medial and lateral compartments of the knee joint. This may be defined as the torque that tends to adduct the knee during gait. Higher than normal peak external knee adduction moment has been found in patients with knee OA, which reflects an increased load on the medial compartment (Hurwitz et al. 1998, Baliunas et al. 2002).

Weidenhielm has drawn attention to the external adductor moment and pointed out the practical difficulty of demonstrating an abductor moment in a clinical setting, possibly by considering it as an external moment. We completely agree with him on this matter. However, the abductor moment, as reported by Vicon 370, was actually the net moment acting at the joint, which reflects an internal moment to counteract the external adductor moment. The Vicon system really measures external moments and changes the sign to describe them as internal moments (abductor moment) in graphs. Therefore, any increase in the external peak adduction moment is reflected as an increase in the abductor moment in this system.

Although many studies have emphasized the importance of dynamic knee joint loads using the external knee adduction moment, some have shown no difference between normal persons and patients with moderate knee osteoarthrosis as regards this moment as well (Weidenhielm et

al. 1994, Kaufman et al. 2001). In a recent study, Hurwitz et al. (2002) reported that the knee adduction moment was more closely correlated to static alignment than to the severity of disease on radiographs, toe out angle and pain and mechanical axis only accounted for about 50% of its variation in patients with knee OA. Furthermore, Zhang and Wang (2001) showed that humans could control dynamic and static aspects in abduction-adduction by differential co-contraction of medial and lateral muscles crossing the knee. It seems that more studies are needed to evaluate the dynamic and quasi-static control in knee abduction-adduction to understand better the clinical significance of the coronal plane moments in knee OA.

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