LAXITY IN HEALTHY AND OSTEOARTHRITIC KNEES

Introduction. Though osteoarthritis (OA) is believed to result from local mechanical factors acting within a susceptibility determining milieu, mechanical factors in the natural history of human OA have been minimally evaluated. Evidence that knee laxity may contribute to the development and progression of OA include: OA develops in animal models after ligament transection; laxity is associated with clinical OA, with large displacements and suboptimal distribution of forces on the articular cartilage; generalized joint hypermobility syndromes may predispose towards knee OA; with aging occur a decline in the material properties of knee ligaments and an increase in the incidence of knee OA.

While laxity (primary capsuloligamentous or injury related) may contribute to OA development, it may also be a consequence of severe OA, especially in the frontal plane (varus-valgus), e.g. possibly due to loss of cartilage or bone height. At early stages of knee OA, varus-valgus laxity is unlikely to be a consequence of disease. In examining varus-valgus laxity by stage of OA, previous studies have exclusively used global measures of OA severity, with inconsistent results. Specific pathologic events in knee OA are likely to have opposing effects on varus-valgus rotation. The paucity of information relates in part to the difficulty obtaining reliable measurements. Our goals were to develop a measurement system for varus-valgus rotation and to test the following hypotheses. To explore if some portion of the increased varus-valgus laxity of knee OA may predate the disease, we tested whether: a) among subjects with healthy knees, varus-valgus rotation increases with age; b) mildly involved or uninvolved knees of knee OA patients are more lax than knees of older controls without OA. To examine the relationship between specific aspects of OA and varus-valgus rotation, we tested whether, in knee OA patients: a) joint space narrowing and bone contour deformity are each associated with greater varus-valgus laxity; b) higher osteophyte grade is associated with less varus-valgus laxity.

Methods. 25 young controls, 23 older controls without clinical OA, any sign of radiographic knee OA, or history of knee injury, and 164 patients with knee OA were evaluated. OA patients were requested to have definite osteophytes in at least one knee. Exclusion criteria were: steroid injection within 3 months; any inflammatory arthritis; OA secondary to other diseases, e.g. Paget’s, joint disorders. Rosemont: AAOS; 1995. p. 481-496.

Knee x-rays were obtained in the same unit by 1 of 2 technicians. The authors have not received anything of value from a commercial or other party related directly or indirectly to the subject of my presentation.

In OA patients, varus-valgus laxity increased as joint space decreased (slope = -.39, p < 0.001) and was greater in knees with versus without bone deformity (p = .002). With rising osteophyte grade, varus-valgus laxity declined from grades 0 to 2 and rose from grades 2 to 4, possibly due to concomitant loss of bone and cartilage height. K/L grade followed the same trend. Results of the present study using a person-based or a knee-based approach. Varus-valgus laxity did not differ between those patients with knee OA who had experienced past knee injury and those who had not. AP translation did not correlate with age, did not differ between OA patients and controls, and declined slightly with more severe OA.

Discussion. A measurement system was developed for varus-valgus laxity, substantially more reliable than physical exam assessments. The absence of findings for AP laxity may reflect lack of sensitivity of the KT1000 system in this setting.

Varus-valgus laxity was greater even in uninvolved or mildly involved knees of OA patients vs. older control knees, suggesting that varus-valgus laxity is not exclusively a consequence of osteoarthritic pathology. Laxity might increase variably with healthy aging, predisposing some people to develop knee OA. Osteophytes were associated with a trend towards decrease or stabilization in varus-valgus rotation. With progressive disease, loss of cartilage/bone height appeared to override the stabilizing effect of osteophytes. In knee OA, the amount of varus-valgus rotation is variable, and, even as a consequence of disease, greater laxity may contribute to subsequent progression.

Varus-valgus laxity is a modifiable factor that may increase risk of knee OA and may cyclically contribute to disease progression.

References
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