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ORIGINAL COMMUNICATION

Influence of Cartilage and Menisci on the Sagittal Slope of the Tibial Plateaus

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We analyzed the magnetic resonance studies of the knee in 80 subjects, 45 men and 35 women with a mean age of 38.9 years, who showed no pathological condition of the joint. Using an imaging visualization software, the sagittal longitudinal axis of the tibia was identified. The angle between this axis and a line tangent to the bone profile of the tibial plateau (bone slope) and to the superior border of the menisci (meniscal slope) were calculated. Thickness of anterior and posterior portion of menisci and underlying cartilage were also measured. The bone slope averaged 8° and 7.7° on the medial and lateral sides, respectively. The mean meniscal slope was 4.1° and 3.3° on the medial and lateral sides, respectively, with a significant difference compared with the bone slope. Menisci and underlying cartilage were significantly thicker in their posterior than their anterior portion (7.6 and 5.2 mm, respectively, in the medial compartment; 8.6 and 5.2 mm, respectively, in the lateral compartment). The presence of cartilage and menisci implies a significant decrease in the posterior tibial slope. In the lateral compartment, the greater the bone slope, the larger the difference between bone and meniscal slope, which means that a marked posterior tilt of the lateral tibial plateau is decreased by the cartilage and meniscus. These findings should be taken into account in planning surgical procedures which affect the slope of the articular tibial surface. Clin. Anat. 00:000–000, 2012.

Key words: tibial slope; total knee arthroplasty; knee meniscus; knee biomechanics

INTRODUCTION

The inclination of the tibial plateaus on the sagittal plane, i.e., the sagittal tibial slope, is the tilt of tibial articular surface with respect to the sagittal longitudinal axis of the tibia, or a line perpendicular to it. Since the tibial plateaus are usually higher in the anterior than the posterior portion, the sagittal tibial slope is tilted posterocaudally in the vast majority of individuals (Matsuda et al., 1999; Hashemi et al., 2008; Hudek et al., 2009). The inclination of the joint surface of the tibia has a considerable influence on the biomechanics of the knee joint. It has been shown that, during weight-bearing, an increase in the posterior tibial slope enhances the

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