An analysis of the pivot shift phenomenon. The knee motions and subluxations induced by different examiners


Abstract: The description of the pivot shift test and its modifications is for the most part based on clinical observations. We wished to precisely determine the knee motions and medial-lateral tibiofemoral compartment subluxations that examiners induce in the knee joint to produce the pivot shift phenomenon. Eleven skilled knee surgeons performed the pivot shift test on an instrumented cadaveric lower limb. The anterior cruciate and superficial medial collateral ligaments (long fibers) of one limb were sectioned to produce an abnormal state. An instrumented spatial linkage allowed all six degrees of freedom motions to be measured. Before and after ligament sectioning we determined the limits of knee motion under defined loading conditions. The tibial and femoral bony landmarks were digitized to determine the positions of the medial and lateral tibial plateaus in reference to the femoral condyles during the pivot shift tests. Each examiner performed his pivot shift test. The analysis of the data showed that examiners typically induced a coupled anterior translation and internal tibial rotation to produce an anterior tibial subluxation, and a coupled posterior translation and external tibial rotation to induce the reduction event. The magnitude of anterior subluxation of each plateau depended upon the examiner's technique. The maximal anterior subluxation of the lateral tibial plateau varied from 14 to 19.8 mm (mean, 17.2 +/- 2.0 mm), whereas anterior subluxation of the medial tibial plateau ranged from 6 to 16.9 mm (mean, 11.2 +/- 3.3 mm). (ABSTRACT TRUNCATED AT 250 WORDS)