

1. Am J Sports Med. 1992 May-Jun;20(3):299-306.

Anterior-posterior and rotational displacement of the tibia elicited by quadriceps contraction.

Hirokawa S, Solomonow M, Lu Y, Lou ZP, D'Ambrosia R.

Department of Orthopaedic Surgery, Louisiana State University Medical Center, New Orleans 70112.

Comment in

Am J Sports Med. 1992 Nov-Dec;20(6):784.

The anterior-posterior displacement and rotation of the tibia elicited by isolated loading of the quadriceps muscle was determined as a function of joint angle and muscle load using a computerized radiographic technique. Data collected from 12 fresh-frozen cadaveric knees demonstrated that quadriceps contraction can result in significant (less than 7 mm) anterior displacement of the tibia in the range of 0 degrees to 80 degrees of flexion, and a mild (less than 2 mm) posterior displacement in the range of 80 degrees to 120 degrees of flexion. Peak anterior displacement of 6.3 mm was observed at 30 degrees of flexion under a 12 kg load in the quadriceps, while a constant 1.5 mm posterior displacement was observed throughout flexion angles exceeding 80 degrees. It was further shown that the magnitude of the anterior displacement increased nonlinearly as the

quadriceps force increased. Loading of the quadriceps also resulted in internal rotation of the tibia in the range of 0 degrees to 90 degrees of flexion, and in external rotation of the tibia in the range of 90 degrees to 120 degrees. Peak internal rotation of 7 degrees was observed at 15 degrees of flexion and a peak external rotation of 1 degrees was detected at 120 degrees of flexion. Larger quadriceps load resulted in larger rotation. We concluded that quadriceps contraction during knee extension has direct impact on anterior displacement and rotation of the tibia and therefore on anterior cruciate ligament stress, increasing it as the muscle's force is increased during knee extension.(ABSTRACT TRUNCATED AT 250 WORDS)

PMID: 1636861 [PubMed - indexed for MEDLINE]