THE EFFECT OF THE POSTERIOR BUNDLE OF THE MEDIAL COLLATERAL LIGAMENT ON ELBOW STABILITY

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Background: The medial collateral ligament consists of three distinct bundles: anterior, posterior and transverse. The anterior bundle is considered the most important ligamentous stabilizer against valgus stress, posteromedial instability and internal rotation of the ulna. The transverse ligament has no known function. The role of the posterior bundle (PMCL) in stability of the elbow remains poorly defined. The purpose of this study was to determine the effect of sectioning the PMCL on the stability of the elbow.

Methods: Varus and valgus gravity-loaded passive elbow motion and simulated active vertical elbow motion were performed on 11 cadaveric arms. An in-vitro elbow motion simulator, utilizing computer-controlled pneumatic actuators and servo-motors sutured to tendons, was used to simulate active elbow flexion, with the forearm maintained in both supination and pronation. Varus/valgus angle and internal/external rotation of the ulna with respect to the humerus were recorded using an electromagnetic tracking system, in varus, valgus, and vertical orientations. Testing was performed on the intact elbow and following sectioning of the PMCL.

Results: With active flexion in the vertical position the varus/valgus kinematics were unchanged after PMCL sectioning (p=0.08). However, with the forearm in pronation, there was a significant increase in internal rotation after PMCL sectioning compared to the intact elbow (p<0.05) which was most evident at 0° and 120° degrees of flexion (p<0.05). This rotational difference was not statistically significant with the forearm in supination (p=0.07). During supinated passive flexion in the varus position, PMCL sectioning resulted in increased varus angulation at all flexion angles (p<0.05). In pronation varus angulation was only increased at 120° of flexion (p<0.05). However, internal rotation was increased at flexion angles of 30° to 120° (p<0.05). During passive flexion in the valgus position, cutting the PMCL did not affect varus/valgus angulation (p>0.08). In supination, sectioning the PMCL had no significant effect on maximum varus-valgus laxity or maximum internal rotation (p=0.1). However, in pronation, the maximum varus-valgus laxity increased by 3.5° (30%) and maximum internal rotation increased by 1.0° (29%) (p<0.05).

Discussion: These results indicate that isolated sectioning of the PMCL causes a small increase in varus angulation and internal rotation during both passive varus and active vertical flexion. This study suggests that isolated sectioning of the PMCL may not be completely benign and may contribute to varus and rotation instability of the elbow. In patients with insufficiency of the PMCL appropriate rehabilitation protocols (avoiding