Injuries to the medial ulnar collateral ligament (MUCL) are not uncommon. Classically, this injury is seen in the overhead throwing athlete. Most injuries are treated nonoperatively with good results. A small subset of athletes may require operative reconstruction of the anterior band of the MUCL if they are unable to return to their pre-injury level of function following conservative management. The MUCL is the major restraint to valgus stress of the elbow from 30 to 120 degrees flexion. This ligament serves an integral function in overhead throwing athletes who experience repeated valgus loads across the elbow. The anterior band of the MUCL has been shown to be the key anatomic component. Current surgical reconstructive techniques are designed to address the anterior band of the MUCL. The goals of surgery are to restore the normal biomechanics and kinematics of the elbow joint. Surgical reconstruction yields good-excellent long term results in up to 93 percent of elite athletes. An understanding of the anatomy of the medial ulnar collateral ligament is critical for successful reconstruction of the MUCL. Dugas et al previously described the soft tissue anatomy of the medial ulnar collateral ligament. These authors failed to describe the length of the ulnar attachment of the ligament. To our knowledge, no study exists describing the osseous or radiographic anatomy of the MUCL ulnar attachment. The purpose of the present study is to describe the soft tissue and osseous morphology of the MUCL ulnar attachment.

Our hypothesis is that the MUCL has a long soft tissue attachment on the proximal aspect of the ulna and its osseous morphology is consistent and present in the majority of osseous specimens.

METHODS:

Osseous Specimens

We selected 100 skeletally mature ulnae from the Cleveland Museum of Natural History. With over 3000 complete human skeletons, the Cleveland Museum of Natural History houses the largest collection of its kind in the Western Hemisphere. There were 50 female ulnae and 50 male ulnae. We selected ulnae aged 20 – 30 years. Any ulna containing signs of arthritis or fracture were excluded from the study. Each specimen was carefully inspected for the presence or absence of the prominent tubercle on the medial aspect of the medial ulna just distal to the articular surface, the ulnar sublime tubercle. We also carefully identified a previously undescribed ridge of bone extending distally from the sublime tubercle, the medial ulnar collateral ridge (Figure 1). Once these structures were identified, digital calipers were utilized to make multiple linear measurements. The length of the medial ulnar collateral ridge was measured from the sublime tubercle to its distal-most extent. We then measured the distance from the horizontal distance from the distal semilunar notch articular surface to the sublime tubercle. All measurements were repeated 3 times and the average of those measurements were taken as our final value.

Computed Tomography

We randomly selected 10 additional ulnas and performed Computed Tomography scans with three dimensional reconstructions. The presence or absence of the sublime tubercle and the MUCL ridge were again noted. Using the digital measuring tools, we repeated each measurement described above. All measurements were repeated 3 times and the average of those measurements was taken as our final value.

Ligamentous Anatomy

Ten fresh-frozen cadaveric specimens were obtained for this portion of the study. The anterior band of the ulnar collateral ligament was carefully identified (Figure 1). Multiple measurements were then made using digital calipers. The linear length of the ulnar collateral ligament ulnar footprint was measured. The anterior band was then sharply dissected from its proximal attachment to the humerus at the medial epicondyle. At this point we carefully dissected the entire ulnar collateral ligament from its attachment to the ulna. The entire length of the ligament was then measured with digital calipers. All measurements were performed three times and the average of those values was recorded.

RESULTS:

Osseous Specimens

The average age of the osseous specimens in our study was 26.4 years (range 20 – 29). The average distance from the sublime tubercle to the articular surface was 5.3 mm. The MUCL ridge extended distally an average of 24.5 mm from the sublime tubercle. The MUCL ridge and sublime tubercle was present in all skeletal specimens.

Computed Tomography

The average distance from the sublime tubercle to the articular surface was 5.8 mm. The MUCL ridge length was 21.6 mm. The MUCL ridge and the sublime tubercle were clearly identified in every specimens on computed tomography images.

DISCUSSION:

Our understanding of MUCL injuries in the overhead throwing athlete continues to evolve. Successful reconstructive surgery in this patient population requires a thorough understanding of the relevant anatomy. To our knowledge, we are the first to describe the MUCL ridge. This ridge extends distally from the sublime tubercle and lends support to the long ulnar attachment as seen in our fresh-frozen specimens and as also described by Dugas et al. The presence of the MUCL ridge suggests that common reconstructive techniques may not adequately restore the true anatomy of the MUCL ulnar attachment. In fact, standard reconstruction techniques may fail to reconstruct half of the ulnar footprint of the MUCL. We have successfully shown that the sublime tubercle and MUCL ridge are consistent landmarks. Both landmarks may be utilized for anatomic reconstruction of the ulnar collateral ligament anterior bundle. Further clinical studies are needed to determine if more accurate anatomic reconstruction of the MUCL will lead to better subjective and objective patient outcomes.

REFERENCES:

References are optional