Baseball *Research*

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Elbow Muscles can Protect Elbow Injury and Avoid Tommy John Surgery

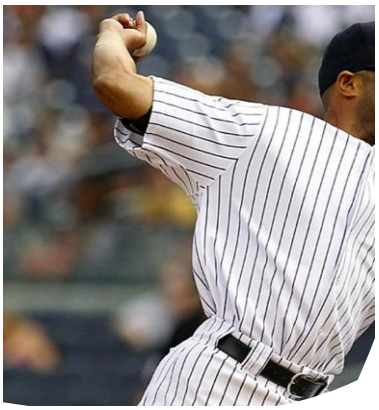
Elbow MCL injury in throwing athletes continues to occur with high frequency and often requires Tommy John Surgery and the loss of playing for at least one full season. Efforts to better understand MCL injury and therefore prevent injury and accelerate recovery have been ongoing at our institution. Dr. Christopher Ahmad recently conducted an experiment to analyze the elbow muscle forces and how they contribute to stabilizing the elbow and protecting the MCL. Six cadaveric elbows were tested at 30° and 90° of flexion with no other constraints to motion. A full medial collateral ligament tear was simulated in each elbow. Muscle forces were simulated including the biceps, brachialis, and triceps in addition to the forearm muscles called the flexor carpi ulnaris, flexor digitorum superficialis, and pronator teres. Elbow stability data was obtained at each flexion angle with use of a 3-dimensional digitizer. The results demonstrated an expected elbow instability pattern when the MCL was injured.

Christopher S. Ahmad, MD

Dr. Christopher Ahmad studied mechanical engineering at Columbia University setting a foundation to become a national expert in ligament injuries. He trained with Dr. Frank W. Jobe, the inventor of Tommy John Surgery, and now practices sports medicine at Columbia University. He is the Chief of the Sports Medicine Service and the Head Team Physician for the New York Yankees. He has been researching and performing elbow surgery in baseball players for over twenty years and has published over 100 articles related to Tommy John Surgery

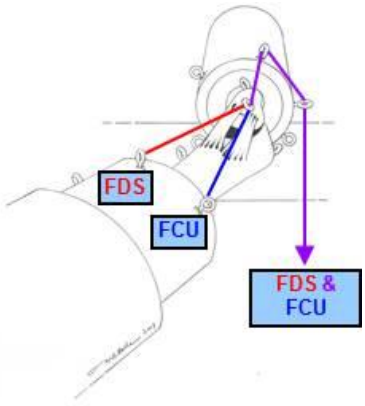
Applying Research to Improve Patient Outcomes

"This information is critical to injury prevention, surgical techniques, and rehabilitation."



The co-contraction of the flexor carpi ulnaris and flexor digitorum superficialis corrected the valgus instability. This research concludes that forearm muscles dynamically stabilizes the elbow against valgus torques generated during throwing. This information is critical to injury prevention, surgical techniques, and rehabilitation in throwing athletes.

BIO-MECHANICAL TESTING



Biomechanical testing used in this research was performed with a custom device that allowed simulation of various elbow muscles while measuring elbow stability. The elbow was subjected to force in the same direction as experienced during throwing.

Park M, **Ahmad CS**: Dynamic Contributions of the Flexor-Pronator Mass to Valgus Stability in the Elbow. *The Journal of Bone and Joint Surgery*, 86-A:2268-2274, 2004

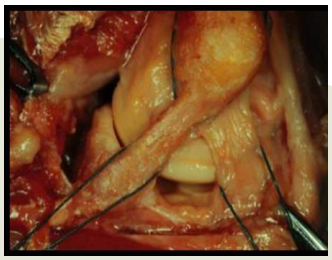


Figure 1: Normal elbow MCL.

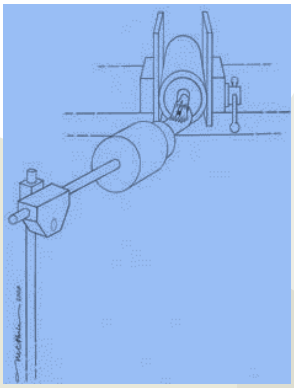


Figure 2: Custom device to test elbow muscle force.

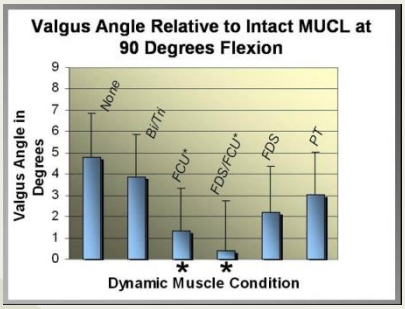


Figure 3: Elbow stability normalizes when FCU (flexor carpi ulnaris) and FDS (flexor digitorum superficialis) are loaded.

To see more research or watch a video of Tommy John Surgery being performed by Dr. Christopher Ahmad, please go to www.ChrisAhmadMD.com

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