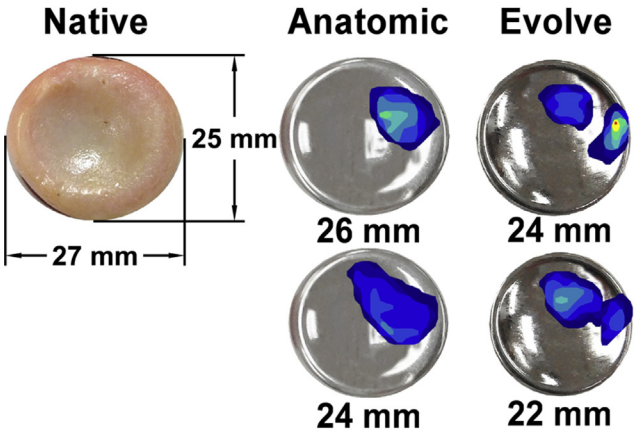

Figure 1 A set of pressure maps for a representative specimen showing distribution for varying design and size (lighter colors = higher pressures).

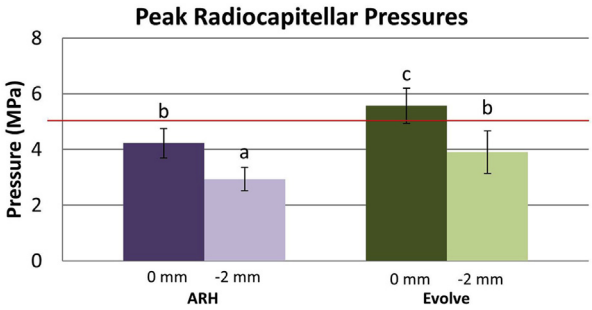

Figure 2 Radiocapitellar contact pressures (mean ± standard error). 0 mm represents manufacturer suggested sizing, -2 mm indicates under-sizing. Lowercase letters (i.e. a, b, c) indicate the results of post-hoc testing using least squares mean comparisons. Columns with letters in common are not statistically different from one another ($P \leq 0.05$). The 5 MPa threshold is indicated with a horizontal red line.

suggestion and give reason to consider doing the same for the Anatomic® prosthesis.

Paper #10 PREVENTION OF POST-TRAUMATIC ELBOW STIFFNESS USING BOTULINUM TOXIN

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Background: Approximately 30% of all upper extremity fractures are elbow fractures. This may lead to elbow stiffness and heterotopic ossification resulting in limited range of motion which is a challenging problem. A sufficient functional arc of motion is stated for flexion-extension 130°-30°-0° and for pronation/ supination 50°-0°-50°.

Aim: To investigate the efficacy of Botulinum Toxin (Botox) injections to prevent postoperative elbow stiffness after trauma, we performed a study in three steps.

Methods: All patients were included who presented to a single surgeon with distal humerus fracture, Monteggia fracture, or olecranon fracture. The study was developed in three steps: 1) prospective comparative pilot study to demonstrate the safeness of use and dosage of Botox between 1999 and 2003, 2) double-blinded prospective, randomized study between 2003 and 2007 to evaluate the functional outcome scores and range of motion and finally, 3) a retrospective study between 2007 and 2017 to assess clinical impact and the functional outcome after elbow fracture. For the prospective group, the Disabilities of the Arm, Shoulder, and Hand (DASH) score, Visual Analogue Scale for pain as well as the range of motion (ROM) were assessed after three months, six months and one year. For the retrospective study, range of motion measurements were recorded and analyzed using a paired t-test.

Results: In total, 79 patients were included, 32 patients (44%) received Botox injections and 47 patients (54%) were in the control group. The pilot study reported that Botox is a safe and effective method to prevent posttraumatic elbow stiffness, lasting six months, with an optimal dosage of 100 units each for the brachialis muscle and biceps brachii. In the prospective randomized study, a significant difference **($p<0.05$)** in VAS score and high positive trend in DASH score after 1 year **($p=0.06$)** between the botulinum **(VAS 1.2±5.2; DASH 11.18±11.0)** and control group **(VAS 5.7±21.9; DASH 54.46±7.59)** could be identified. For ROM, a positive trend especially for extension could be identified in Monteggia and significant difference in Intercondylar fracture **($p<0.05$)** 6-weeks postoperatively.

Conclusions: Botulinum toxin is a safe and promising treatment to prevent post-traumatic elbow stiffness. Our study demonstrates improved early range-of-motion, and better functional outcome like VAS and DASH score.

Paper #11 COUNTERFORCE BRACING OF LATERAL EPICONDYLITIS: A PROSPECTIVE, RANDOMISED, DOUBLE BLINDED, PLACEBO CONTROLLED CLINICAL TRIAL

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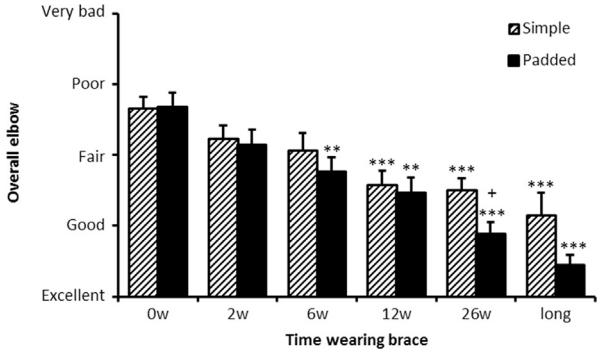
Background: Counterforce bracing is one of the common treatment modalities for tennis elbow. The objective of this study was to determine whether counterforce bracing offers any additional benefit over placebo bracing in the treatment of tennis elbow.

Methods: This prospective, randomised, double-blinded placebo controlled clinical trial investigated the use of counterforce bracing (n=17) compared with placebo bracing (n=14) in the management of acute tennis elbow. Outcome measures included patient rated pain and functional outcomes, epicondyle tenderness and strength at 6 months and long term. Follow up occurred at 2, 6, 12 and 26 weeks, as well as long term (mean follow up 3 years). The study duration was 5 years.

Results: The two groups, counterforce and placebo, were similar in age, sex, hand dominance and duration of symptoms. Both braces improved patient rated pain frequency and severity ($p<0.01$), difficulty with picking up objects and twisting motions, and overall elbow function ($p<0.001$) at 6 months and 3 years. Both braces also improved the lateral epicondyle tenderness, grip strength ($p<0.01$) and modified ORI-TETS (Orthopaedic Research Institute – Tennis Elbow Testing System) force ($p<0.05$) at 6 months. Significant intergroup differences were detected for frequency of pain at rest at 6 and 12 weeks ($p<0.05$), level of pain at rest at 2 weeks ($p<0.001$) and for the patient rated overall elbow function at 26 weeks ($p=0.041$).

Conclusion: The counterforce brace provides significant reduction in the frequency and severity of pain in the short term (2-12 weeks), as well as overall elbow function at 26 weeks, compared with the placebo brace.



Patient rated overall elbow function. Data are presented as mean (standard error of mean), ** $p<0.01$ and *** = $p<0.001$ compared with time 0 using Wilcoxon signed rank tests. + = $p<0.05$ for comparison between groups using Mann-Whitney rank sum test. *w*, weeks

Paper #12 THE DETERMINATION OF INTEROBSERVER AND INTRAOBSERVER RELIABILITY OF A MAGNETIC RESONANCE IMAGING BASED CLASSIFICATION SYSTEM FOR ULNAR COLLATERAL LIGAMENT INJURY

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Background: Despite improvements in the biomechanics and surgical options for UCL tears, there remains a need for a reliable classification of UCL tears that has the potential to guide clinical decision-making.

Purpose: The purpose of this cross-sectional study was to assess the intraobserver and interobserver reliability of the newly proposed MRI-based classification to UCL tears. Secondary objectives included assessing the impact of additional views, discrimination between distal and non-distal tears, and correlation of imaging reads with intraoperative findings of the UCL.

Methods: Nine fellowship-trained specialists from seven institutions independently completed four series surveys consisting of 60 total elbow MRIs with UCL tears using a newly proposed six-stage classification system. The first and third surveys contained a total of 60 coronal MRI images, while the second and fourth contained the same MRI images with both coronal and axial views presented in a random order to assess intraobserver variability using the weighted kappa value and impact of additional imaging views. Weighted kappa values were also calculated for each of the four surveys to acquire interobserver reliability. Reliability analysis was repeated using a two-group classification analysis for distal and non-distal disease. Observer readings were compared to intraoperative UCL findings.

Results: For the newly proposed six-stage MRI-based classification, intraobserver and interobserver reliability demonstrated near perfect and substantial agreement, respectively. These values only increased when sub-stratified into the two-group distal and non-distal disease classification ($p<0.05$). The additional axial view did not statistically improve the agreement between and among readers. Observer readings were accurate for tear grade (partial and complete), proximal location, and distal location, but not midsubstance tears, when compared to intraoperative findings from 30 elbows.

Conclusion: Our newly proposed six-stage MRI-based classification utilizing grade and location of the injury was found to have substantial to near perfect agreement between and within fellowship-trained observers. The results of this study provide a foundation for future validation studies, in which the classification system may be associated with clinical decision-making and patient outcomes.

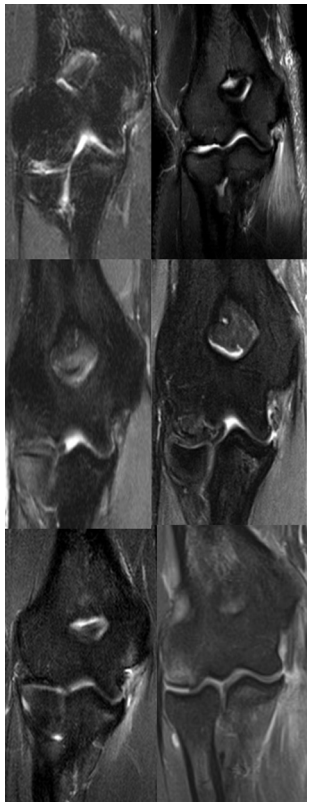

Figure 1 Examples of each UCL tear

Top left: 1A, proximal partial Top right: 1B, proximal complete Middle left: 2A, midsubstance partial Middle right: 2B, midsubstance complete Bottom left: 3A, distal partial Top left: 3B, distal complete