52% are associated with overuse, extensor carpi ulnaris (ECU) pathology. Injuries suffered by this tendon in golfers lead to an average of 3 missed tournaments. Despite ECU being the most frequently injured structure in the wrist/forearm of elite and sub-elite golfers, no study has captured its activity during the golf swing. It is unknown whether ECU is most active in the lead or trail wrist. The purpose of this study was to assess the timing and magnitude of muscle activity in the ECU muscle in the lead and trail forearms tri-planar angular velocity of the lead and trail hands during the golf swing in sub-elite golfers. Methods: Fifteen sub-elite right-handed golfers were recruited for this study. Data was collected utilising an indoor swing studio with a simulator. Trials were conducted by hitting five pitching wedges, five iron and 5 drivers. To assess muscle activity, two wireless EMG sensors (Delsys TrignoTM Mini Sensors, MA, USA) were fixed using double-sided tape directly over the mid point of the muscle belly of the ECU on the left and right forearm with the sensor electrodes aligned perpendicular to the muscle fibre direction. Maximal voluntary contraction from the highest driver value was used as a reference for each player. Performance variables which were collected for analysis were, angle of attack (degrees), swing direction (degrees) and swing speed (miles per hour). Following the completion of the swings, the highest peak half-second EMG signal during the driver swings was used as the normalizing value (100%). Swing phases were divided into backswing, downswing and follow through using the interia measurement units (IMU) sensors placed on each distal forearm and dorsum of the hands. Statistical parametric analysis was used to compare the 303 data points for the lead and trail arms throughout the swing. Results: The mean handicap of the players was 1 (SD 2). Left ECU activity in the backswing and follow-through was significantly higher than the right for all clubs (p<0.001 and p=0.024 respectively). Right ECU activity in the downswing was significantly higher than left for all clubs (p<0.001)(Figure 1-3). During the downswing, ECU activity of the lead side progressively increased towards impact, however in the trail side, ECU activity sharply peaked and then began to decline until impact. The driver had significantly higher ECU recruitment than the 7 iron and pitching wedge (p<0.001). There was no association between ECU activity in either arm and performance characteristics. Conclusion: Despite lead sided injuries being more common, it would appear that the trail side has greater peak activity during the downswing and therefore the peak velocity of the golf swing. Knowledge surrounding the nature of tendon contraction and wrist kinematics during the downswing would be beneficial in further explaining the asymmetric nature of injuries to this tendon.

Category: Elbow/Wrist/Hand

Similar Clinical Outcomes Between Double Cortical Button and Docking Techniques for Ulnar Collateral Ligament Reconstruction in Baseball Players

Abstract ID: 22606

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Summary:
Post-operative outcomes were similar between baseball players who underwent UCLR with the double button technique and the docking technique.

Data:
Objectives: A double button technique using a cortical button on both the humeral and ulnar sides of the UCLR for fixation has recently been proposed, with advantages including greater control over graft tensioning and decreased risk of bone tunnel fracture. This double cortical button technique was recently evaluated biomechanically and found to be non-inferior to the traditional docking technique regarding strength, joint stiffness, and graft strain. However, clinical outcomes have not been compared between the double cortical button technique and standard UCLR techniques such as the docking technique. Therefore, the purpose of this study was to determine whether baseball players who underwent UCLR with a double cortical button (double button) technique have similar return to sport (RTS) rates, time to RTS, and subjective outcomes compared to baseball players who underwent UCLR with the traditional docking (Docking) technique. Methods: Competitive baseball players that underwent primary UCLR from 2011-2020 at across two institutions were identified using the CPT code 24346. Patients were excluded if they were not baseball players or if they did not undergo UCLR with the double button or docking technique. Included patients were contacted via RedCap to complete a follow-up survey evaluating reoperations, RTS, functional outcome scores, and patient satisfaction. Functional outcome surveys include the Kerlan-Jobe Orthopaedic Clinic (KJOC) score, Conway-Jobe score, Andrews-Timmerman (AT) elbow score, and the Single Assessment Numeric Evaluation (SAME) score. Results: Overall, 78 male baseball players (age: 18.9 ± 2.4 years) had an average follow-up of 3.1±2.4 years were evaluated, with 73 of the players being baseball pitchers and 55 (71%) of players completing the functional outcome surveys. Players in the double button group more frequently received palmaris longus autografts (78% vs. 30%) and less frequently received both gracilis autografts (22% vs. 58%) and allografts (0% vs. 13%) compared to players in the docking group (p=0.001); however, all other demographic factors were similar between groups. All post-operative and patient-reported outcomes were also similar between groups. All players in the double button group (100%) were able to RTS in 11.1±2.6 months, while 96% of players in the docking group were able to RTS in 13.5±3.4 months (p>0.05). All other post-operative outcomes and patient-reported outcomes were statistically similar between groups, and remained similar after isolating pitchers only and after separating partial-thickness from full-thickness UCL tears (all p>0.05). Two complications were observed in the docking group, with one player experiencing pain at elbow extension due to nerve neurolysis and another player developing an elbow stress fracture during rehabilitation, while no double button players experienced a complication. Conclusions: Post-operative outcomes were similar between baseball players who underwent UCLR with the double button technique and the docking technique. These findings provide the first clinical outcomes in support of a recent cadaveric study which showed the double button technique to provide similar elbow strength, joint stiffness, and graft strain compared to the docking technique. Larger comparative studies are necessary before a clear clinical recommendation can be made regarding the utilization of double button UCLR for baseball players.

Category: Elbow/Wrist/Hand

A Radiostereometric Analysis of Tendon Migration Following Arthroscopic and Mini-Open Biceps Tendonosis: Interference Screw Confers Greater Construct Stability than All-Suture Anchor Fixation, with No Difference in Patient-Reported Outcomes

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Summary:
A Radiosteometric (RSA) analysis of tendon migration following arthroscopic and mini-open biceps tendonosis: Interference screw confers greater construct stability than all-suture anchor fixation, with no difference in patient-reported outcomes.

Data:
Purpose: To quantify the postoperative migration of the bone/tendon construct between arthroscopic suprascapular (ASPT) and open submuscular (OSPT) techniques via interference screw (IS) fixation demonstrated the least tendon migration, while OSPT with one all-suture anchor with a single suture fixation yielded the most.

Different in Patient-Reported Outcomes

Abstract ID: 23393

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Summary:
Arthroscopic suprascapular (ASPT) and open submuscular (OSPT) techniques via interference screw (IS) fixation demonstrated the least tendon migration, while OSPT with one all-suture anchor with a single suture fixation yielded the most.

Data:
Purpose: To quantify the postoperative migration of the bone/tendon construct between arthroscopic suprascapular (ASPT) and open submuscular (OSPT) techniques via interference screw (IS) fixation demonstrated the least tendon migration, while OSPT with one all-suture anchor with a single suture fixation yielded the most.
deformity was 60.8 mm and 11.2 mm, respectively (P < 0.0001). PROMs did not differ at final follow-up. Conclusion: ASPBT and OSPBT with IS fixation demonstrated the least tendon migration, while OSPBT with one SSSA yielded the most. Compared to IS, fixation with one, but not two, SSSAs resulted in significantly greater migration. Average bead migration following a Popeye deformity was 6.1 cm. To minimize migration when using SSSAs, at least 2 sutures should be used with an interlocking pattern within the tendon.

Category: Elbow/Wrist/Hand

Outcomes Of Radial Head Arthroplasty. A Multicenter Analysis of 405 Cases

Abstract ID# 21294

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Summary:
A review of 405 radial head arthroplasty found excellent survival and direct correlation of revision with increasing size of radial head diameter.

Data:
Introduction: Radial head arthroplasty (RHA) is a commonly performed procedure for the treatment of comminuted radial head fractures. Indications as well as implant types continue to evolve. RHA has had good outcomes with respect to pain relief, range of motion, elbow stability, and mid-term longevity. The current literature is limited to small case series with varying implant types and short-term outcomes. We present a large series of patients from a single institution who underwent RHA and report on complications, revisions, and outcomes. Methods: After IRB approval, a retrospective analysis of RHA cases performed by 75 surgeons at 14 medical centers in an integrated healthcare system between 2006 and 2017 was completed. Patient demographics, comorbidities, implant type, implant head size, and indications were recorded. Patients were contacted via telephone at a minimum of 2 years to obtain QuickDash and Oxford scores. Results: Our study found that revision rate was positively correlated with increasing radial head size. A 26 mm head had 7.7 odds of revision compared to a size 18 mm head (95% CI 1.2 to 150.1). Over 95% of revision cases were performed within the first 36 months of the index procedure. There was a significantly higher overall re-operation rate for terrible triad (18.4%) versus isolated injuries (10.4%), p<0.04. There was no difference between Acumed Anatomic and Wright Medical Evolve radial head implants in overall re-operation, implant revision, post-operative range of motion, or patient-reported outcomes for either isolated or terrible triad injuries. There was no difference in QuickDash or Oxford scores between controls and smokers, diabetics, or those with a psychiatric diagnosis. Obese patients had a significantly lower mean post-operative Oxford score (35.5) compared to controls (38.3), p=0.02, but no significant difference in QuickDash (22.1 vs 19.1, p=0.067). Conclusions: This is the first paper in the literature to demonstrate that the risk of revision is directly correlated with implanted radial head size. There were no differences in outcomes and complications between the two main implants used. Individuals who did not undergo a revision by 3 years’ time tend to retain the implant. Terrible triad injuries had a higher all-cause re-operation rate than isolated radial head fractures, but no difference in the rate of RHA revision. These data reinforce the practice of downsizing radial head implants when deciding on a radial head implant intra-operatively.

Category: Elbow/Wrist/Hand

Does Prehabilitation Prior to Ulnar Collateral Ligament Surgery Affect Return to Sport Rate or Time in Baseball Pitchers with Partial UCL Tears?

Abstract ID# 22602

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Summary:
Baseball players who attempt rehabilitation prior to UCL surgery have similar post-operative outcomes compared to baseball players who do not attempt rehabilitation prior to surgery.

Data:
Background: The benefits of prehabilitation have been studied and implemented for ACL surgery, but have not been evaluated for UCL surgery. Therefore, the purpose of this study was to determine whether baseball players with partial UCL team who completed at least 4 weeks of prehabilitation prior to surgery (Prehab) had better post-operative outcomes and quicker return to sport (RTS) time than players who attempted 0-3 weeks of physical therapy prior to UCL surgery (No Prehab). Methods: Baseball players of all competitive levels who underwent primary UCL reconstruction (UCLR) or UCL repair for partial-thickness UCL tears from 2010-2019 were included. Physician chart notes and operative notes were screened to identify whether preoperative conservative treatment was attempted. Patients were contacted via RedCap to collect postoperative outcomes (reoperation, revision, complications) and patient-reported outcomes (RTS, Kerlan-Jobe Orthopaedic Clinic [KJOCC] score, Andrews-Timmermann score, satisfaction). Results: Overall, 105 baseball pitchers were included (50 Prehab vs. 55 No Prehab) followed up at 3.4 ± 2.5 years postoperatively. Six pitchers underwent UCL repair, and 99 pitchers underwent UCLR. All demographics were similar between groups except the Prehab group more frequently received a gracilis graft (77% vs. 51%, p=0.038). RTP rate (Prehab: 88.1% vs. No Prehab: 93.8%, p=0.465) and RTP duration (12.8 ± 5.2 months vs. 14.0 ± 4.1 months, p=0.307) were similar between groups. All other postoperative outcomes were also similar between groups, including revision rates and patient-reported outcomes. Conclusions: Baseball players who attempt rehabilitation prior to UCL surgery have similar post-operative outcomes compared to baseball players who do not attempt rehabilitation prior to surgery. Purposeful prehabilitation may not be necessary in baseball players undergoing operative UCLR/UCL repair; however, rehabilitation still plays an important role in players who may succeed without surgery.

Category: Elbow/Wrist/Hand

CT Sagittal Image Evaluation for Osteochondritis Dissecans of the Elbow Correlates with Clinical Outcomes of Arthroscopic Debridement in Adolescent Baseball Players

Abstract ID# 21750

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Summary:
Posterior or large osteochondral defects of the humeral capitellum on preoperative reconstructed CT sagittal images were associated with poor outcomes of arthroscopic debridement for capitellar OCD in adolescent baseball players.

Data:
Objectives: To investigate the relationship between size and location of osteochondral defects in capitellar osteochondritis dissecans (OCD) measured on coronal and sagittal reconstructed computed tomography (CT) images and the clinical outcomes of arthroscopic debridement in adolescent baseball players. Methods: This retrospective study investigated the clinical outcomes of arthroscopic debridement for capitellar OCD in adolescent baseball players with at least 24 months of follow-up after surgery between 2008 and 2020. Outcome measures were determined using the Timmerman–Andrews score at the latest follow-up. On a preoperative reconstructed CT coronal image, defect size (%) was described as the length of the defect relative to the length of the capitellum. On a preoperative reconstructed CT sagittal image, the superior and inferior angles (degrees) were used to describe the location of the defect. Defect angle (degrees) was used to describe the size of the defect on the sagittal plane. Spearman’s rank correlation coefficient was used to examine relationships between the Timmerman–Andrews score and each of the parameters of defect size, superior and inferior angles, and defect angle as well as between each Timmerman–Andrews sub-score and these parameters. Significance was established at p < 0.05. Results: