(CT) scan obtained on all patients, and arthritis graded with Samilson and Prieto (SP) grade. All patients were treated with hardware removal, capsular release with subsequent repair and fresh distal tibial allograft to the glenoid. Outcomes pre- and post-revision were assessed with ASES (American Shoulder and Elbow Score), Single Assessment Numerical Evaluation (SANE), and Western Ontario Shoulder Index (WOSI), and statistically compared. All patients underwent a CT scan of the distal tibial allograft at a minimum time point 4 months after surgery.

Results: There were 31 patients enrolled (all males), with mean age 25.5 (range, 19 to 38), and, with mean follow-up of 47 months (range, 36 to 60) after the revision with distal tibial allograft. All patients after their Latarjet presented with recurrent shoulder dislocation (11/31) or recurrent subluxation (20/31) and all patients had recurrent shoulder instability on examination. Radiographs demonstrated two fixation screws in all cases, mean SP grade of 0.5 (range, I to III), and CT scan demonstrated that mean 78% of the Latarjet coracoid graft had resorbed (range, 50 to 100). Preoperative outcomes improved for ASES (40 to 92, $P = .001$), SANE (44 to 91, $P = .001$), and WOSI (1300 to 310, $P = .001$). There were no recurrences, and final CT scan of the distal tibia revision demonstrated a 92% union.

Conclusions: Although the failed Latarjet with subsequent instability remains a challenge, treatment with fresh distal tibial allograft provided substantial improvement in terms of stability and function. The vast majority of the failed Latarjets had near complete resorption of the coracoid graft, and included multiple with hardware complications. Additional long-term studies are necessary to determine efficacy of this challenging revision population.

Paper #5 BIOMECHANICAL ANALYSIS OF PLATE FIXATION IN THE LATARJET PROCEDURE

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Background: The Latarjet procedure has become the treatment of choice for the management of patients with anterior glenohumeral instability with clinically significant anterior glenoid bone loss. Multiple techniques for coracoid fixation have been described, all of which utilize a variety of screw constructs with varying screw sizes. Recently, the use of a mini-plate has been reported, with encouraging radiographic outcomes. The purpose of this study was to determine the biomechanical properties of mini-plate fixation for the Latarjet procedure, and to compare these findings to various screw fixation configurations.

Methods: Eight fixation groups (n = 5 specimens per group) were tested at a screw insertion angle of 0° including **I)** 3.75 mm single-screw, **II)** 3.75 mm double-screw, **III)** 3.75 mm double-screw with washers, **IV)** 3.75 mm double-screw with mini-plate, **V)** 4.00 mm single-screw, **VI**) 4.00 mm double-screw, **VII)** 4.00 mm double-screw with washers, and **VIII)** 4.00 mm double-screw with mini-plate. In addition, for groups **I-III** and **V-VII**, 30 additional specimens (n = 5 per group) were tested at a screw insertion angle of 15° (groups **IX-XIV**). To maintain specimen uniformity, rigid polyurethane foam blocks were used (30pcf, Sawbones, Pacific Research Laboratories Inc., WA, USA). For all specimens, testing parameters included a preload of 214N for 10 seconds, cyclical loading from 184-736N at 1 Hz for 100 cycles, and failure loading at a rate of 15 mm/min until 10 mm of displacement or specimen failure occurred (ElectroPuls E10000, Instron, UK, **Fig. 1**). Maximum load to failure and failure mode were the primary outcomes of interest. In addition, a full-field stereo-optical measurement system (ARAMIS, GOM mbH, Germany) was utilized to evaluate graft strain, graft displacement, and screw displacement and rotation. Statistical analysis was performed via ANOVA utilizing SigmaPlotversion 12.0, Systat Software Inc., USA.

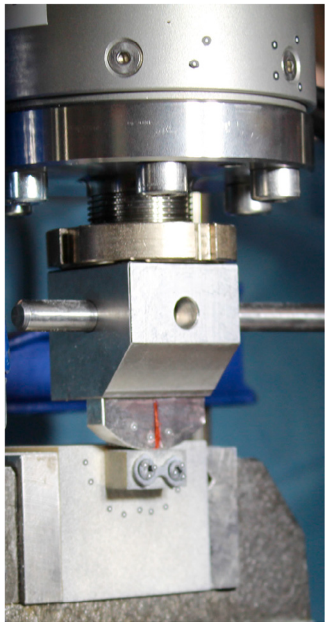

Figure 1 Test setup showing the mini-plate fixation construct with 4.00 mm screws (Group VIII).

Results: All specimens in Groups **I** and **V** (single screw constructs) as well as 77% of specimens within groups **IX-XIV** (screw insertion angle of 15°) failed prior to the completion of cyclical loading; all but 1 of the other specimens survived and underwent maximum load to failure testing (1 specimen in group **VII** failed). Across all groups, Group **VIII** (4.00 mm; plate) demonstrated the highest maximum failure load ($P < .001$, **Fig. 2**), averaging loads 770N higher than the next highest group ($P < .001$). There was no significant difference in displacement during cycling between specimens with plate fixation (groups **V** and **VIII**, $P > .05$). There were no differences in failure loads among specimens in with single-screw fixation (groups **I, V, IX**, and **XII**; $P > .05$). All specimens in groups **IX, X, XI, XII, XIII**, and **XIV** (insertion angle of 15°) had significant lower maximum loads to failure compared to their specimens in Groups **II, II, IV, VI, VII**, and **VIII**, respectively ($P < .001$ for all).

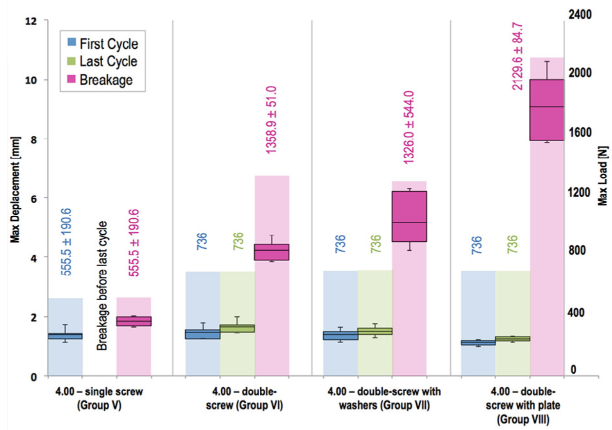

Figure 2 Displacement as Whisker Bars with maximum loads for Groups V, VI, VII, and VIII.

Conclusions: This is the first study to report on the biomechanical properties of the mini-plate for coracoid fixation in the Latarjet procedure. The results indicate significantly superior failure loads with the mini-plate compared to all other constructs, which may have clinical implications, particularly in the high-demand contact athlete. Across all fixation techniques and screw sizes, constructs with screws inserted at 0° performed better than constructs inserted at 15°. Overall, for graft fixation during the Latarjet procedure, this data suggests superior biomechanical properties with mini-plate versus conventional screw fixation. Clinical studies with analysing patient outcomes and failure rates are necessary to determine the clinical implications of these biomechanical findings.

Paper #6 SMART PHONE “SELFIES”âA RELIABLE AND ACCURATE TOOL FOR MEASURING ELBOW RANGE OF MOTION

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Introduction: It has been previously demonstrated that digital photography is an accurate and reliable tool for capturing elbow range of motion when patients are carefully positioned by orthopaedic surgeons. Our hypothesis was that self-taken photographs (“selfies”), performed independently after instruction by video or illustrated handout, would be an accurate and reliable tool for capturing elbow range of motion in patients with elbow contractures.

Methods: 50 patients presenting with elbow contractures participated in the study. After completion of the selfie (Fig. 1), the senior author clinically measured flexion and extension with a goniometer. The angles from the photographs were measured and analyzed.

Results: The agreement between measurements obtained by goniometer and from the “selfies” correlated closely ($R^2 = 0.98$, Fig. 2). Agreement was excellent in both extension and in flexion with interclass correlation coefficients (ICC) of ≥0.93. Systematic errors were also low (Fig. 3). Systemic error was 0° (95% C.I., ±11°) in extension. Systemic error in flexion was –3° (95% C.I., ±10°). Six patients demonstrated ≥10° difference between clinical and selfie measurements. Four of those six patients did not flex or extend to their limit of motion, but did so after personal instruction. Ability take a usable selfie, was inversely correlated with age (R^2=0.97).

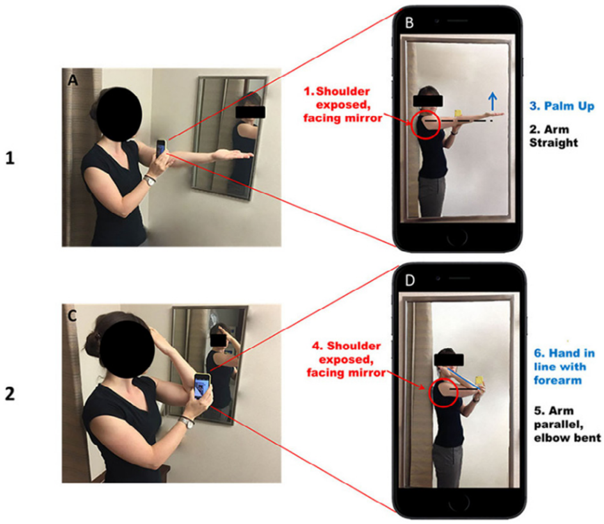

Figure 1 (A) 1.Shoulder exposed, facing mirror. (B) 2. Arm straight. 3. Palm up. (C) 4. Shoulder exposed, facing mirror. (D) 5. Arm parallel, elbow bent. 6. Hand in line with forearm.

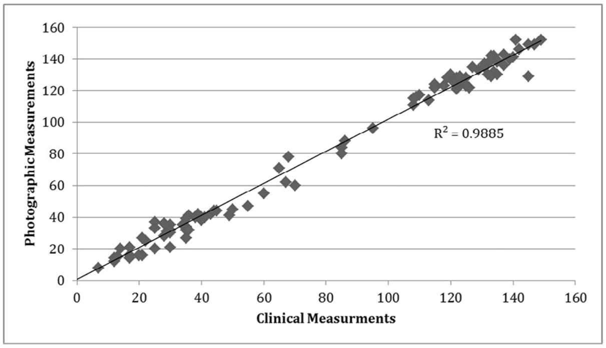

Figure 2 Correlation between clinical and photographic measurements.

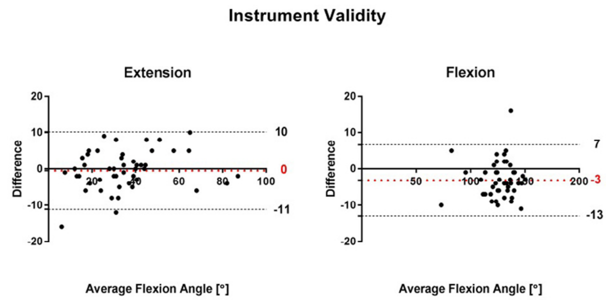

Figure 3 Instrument validity.

Conclusion: Self-taken flexion-extension photographs are a reliable and accurate tool for measuring elbow range of motion. This important parameter of elbow function can therefore be obtained outside a normal clinic visit, thereby improving frequency of follow up assessments (and minimizing loss to follow up) necessary for quality control and research.

Paper # 7 SAFETY OF POSTERIOR ENDOSCOPIC DISTAL BICEPS REPAIRS

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Background: A prerequisite to restoring preinjury supination strength following a distal biceps rupture is tendon re-attachment to its footprint.[1] An ECU / supinator muscle splitting approach reliability exposes the footprint, but iatrogenic injury to the supinator has been associated with decreased strength.[1] Repairing the distal biceps tendon using endoscopy is a unique technique that minimizes supinator injury while providing the visualization required for an anatomic repair (Fig. 1).[2] The goal of this study is to determine safe posterior endoscopy portals for distal biceps repair.

Methods: In 11 adult cadaveric specimens, the distal biceps tendons were re-attached to their footprints using endoscopy through two posterior cannulas positioned within the ECU. After repair, a flexible dilator was placed along the bicipital tunnel and through the distal cannula (Fig. 2). The dilator marked the distal extent of the endoscopic dissection.

The specimens were then dissected under loupe magnification. The PIN location was measured (LS Starrett caliper, accuracy 0.01 mm) from its dorsal location to the dilator and the olecranon—radial styloid (ORS) reference line (Fig. 3). The anatomic findings were used to