outcomes, while lacking any donor site morbidity. Return to sport is a relevant clinical outcome in these cohorts, because they are often composed of young, active individuals, and comparison of both techniques is essential in patient counseling and management.

Methods: A prospectively maintained institutional registry was queried between 2005-2016 for all patients undergoing latarjet or DTA for recurrent anterior shoulder instability. Patients with multidirectional instability, ligamentous laxity, or lack of preoperative sporting activity were excluded. Cohorts were matched using 1:1 propensity scores, using the nearest neighbor method, by age, gender, number of previous surgeries, and participation in contact sport. Preoperative 3d reconstructions of computed tomography (CT) scans were evaluated for glenoid bone loss, glenoid track, and humeral bone loss. A custom questionnaire was administered via phone to all included patients regarding participation in preoperative and postoperative sport. Sub-analysis was performed for return to contact sports, as defined by the American Academy of Pediatrics, and upper extremity demand. Recurrence of instability, need for revision surgery, range of motion, and change in Western Ontario Shoulder Instability Index (WOSI) score were also collected.

Results: A total of 80 patients (40 latarjet, 40 DTA) met inclusion/exclusion criteria. Average follow-up was 46.4 ± 20.0 months for latarjet cohort and 71.7 ± 20.4 for DTA. With regard to latarjet and DTA respectively, average age was 28.2 ± 7.2 and 26.7 ± 5.3 years (*P* = .711), male:female ratio was 32:8 and 33:7 (*P* = .105), bmi was 26.8 ± 7.2 and 26.7 ± 5.3lbs/kg^2 (*P* = .907), number previous procedures were 1.0 ± 0.7 and 1.4 ± 1.2 (*P* = .079), and proportion playing contact sports was 28/40 and 28/40 (p = 1.00). Preoperative glenoid bone loss was 15.5 ± 4.9% (*P* = .075), humeral bone loss was 2611.2 ± 2137.0 and 2453.4 ± 2310.5 mm^3 (*P* = .816), and proportion of off-track lesions was 29.4% and 50.0% (*P* = .631) for latarjet and DTA procedures, respectively. When comparing the latarjet and DTA respectively, rate of return to OR was 3/40 and 4/40 (*P* = .692), recurrent instability was 15.0% and 27.5% (*P* = .172), and return to sport was 35/40 and 36/40 (*P* = .726). There was a significant difference between cohorts in the rate of return to contact sports (26/29 vs 19/30, *P* = .017), same/better level of competition (32/35 vs 24/36, *P* = .010) and intensity (26/35 vs 18/36, *P* = .035), and external rotation (-12.8 ± 21.2 vs 4.7 ± 9.8, *P* = .044) for latarjet and DTA, respectively. No difference was found with respect to postoperative WOSI score (*P* = .081), return to sports requiring the throwing motion (*P* = .298), and satisfaction with regard to surgery (p = 1.0), sport (*P* = .060), and fitness level (*P* = .818).

Conclusion: Both glenoid reconstruction with DTA and the latarjet offer high levels of satisfaction, return to sport, and improvement in clinical outcomes in patients with recurrent anterior instability. The latarjet was found to be superior in achieving return to similar level and those involved in contact sports. The findings of this study inform clinical decision making in selecting the appropriate patient for each procedure given appropriate indications in medical history, demographics, and bone loss (Fig. 1) (Table 1).

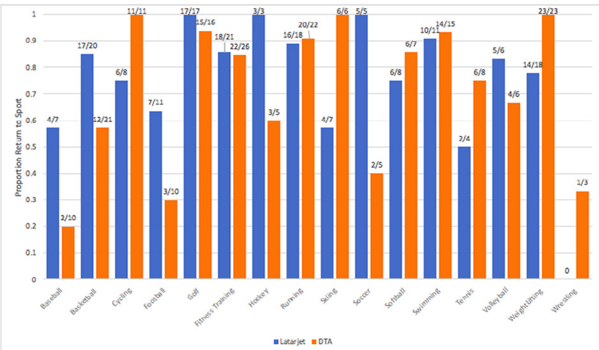

Figure 1 Distribution of return to sport outcomes by activity.

Paper #4 MANAGEMENT OF THE FAILED LATARJET PROCEDURE: OUTCOMES OF REVISION SURGERY WITH FRESH DISTAL TIBIAL ALLOGRAFT

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Introduction: A patient with recurrent instability after a failed Latarjet procedure remains a challenge to address. The vast majority of these result in large amounts of bone loss, resorption, and issues with retained hardware.

Purpose: To determine the outcomes of patients who underwent revision surgery for a recurrent shoulder instability after a failed Latarjet procedure.

Methods: All consecutive patients who presented with recurrent anterior shoulder instability after a Latarjet procedure were prospectively enrolled. Patients were included if they had a prior Latarjet, may have had numerous prior instability procedures prior, and history and physical examination findings consistent with recurrent anterior shoulder instability. Patients were excluded if they had prior neurologic injury, a seizure disorder, bone graft requirements to the humeral head, or findings of multidirectional or posterior instability. History of shoulder instability was documented, including initial dislocation history, time of instability, number of prior procedures, and examination findings, as well as plain radiographic data and computed tomography

Table 1 Sub-analysis of return to sport outcomes following Latarjet and DTA reconstruction

	Latarjet	DTA	*P*-value
Return to contact sports			
No contact	4/4 (100%)	5/5 (100%)	n/a
Limited contact	3/3 (100%)	4/4 (100%)	n/a
Contact/collision	26/29 (89.7%)	19/30 (63.3%)	**.017**
Unclassified	4	1	
Return to highest level of upper extremity demand			
Low demand	5/5 (100%)	5/5 (100%)	n/a
High demand	27/29 (93.1%)	28/32 (87.5%)	.465
Not upper extremity	6	3	
Return to throwing sports			
Throwing sport	9/17 (52.9%)	8/22 (36.4%)	.298

(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.

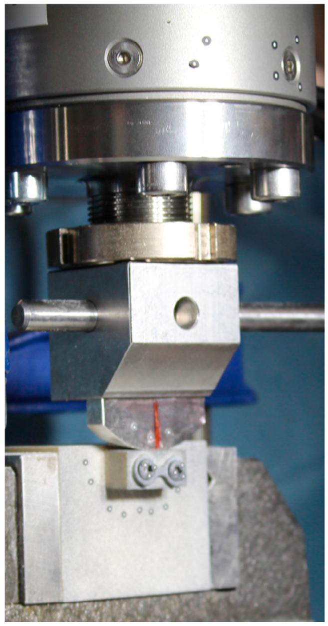

Figure 1 Test setup showing the mini-plate fixation construct with 4.00 mm screws (Group VIII).

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).

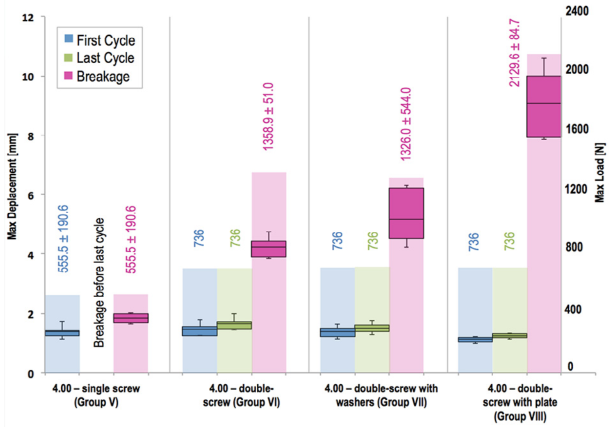

Figure 2 Displacement as Whisker Bars with maximum loads for Groups V, VI, VII, and VIII.