Chronic Distal Biceps Reconstruction Using Achilles Allograft Demonstrates Excellent Satisfaction and Functional Recovery: A Retrospective Cohort Study with Mean 4-Year Follow-Up

Larry Chen, Emily A Berzolla, Isabella B Jazrawi, Nathaniel P. Mercer, James Messina, Michael J Alaia, Laith M Jazrawi

INTRODUCTION:

Chronic distal biceps tendon ruptures are often surgically challenging due to tendon retraction, scarring, fibrosis, and compromised tissue quality, making primary repair unfeasible. In such cases, reconstruction using tendon allograft presents a promising alternative to restore elbow flexion and forearm supination function. However, the outcomes following this approach, particularly with regard to patient satisfaction, cosmetic appearance, and strength recovery, remain limited in the literature. The purpose of this retrospective cohort study was to evaluate clinical and patient-reported outcomes after distal biceps tendon reconstruction with Achilles tendon allograft. We hypothesized that patients would report high satisfaction and excellent functional recovery despite potential cosmetic deformities.

METHODS:

We conducted a retrospective review of patients with chronic distal biceps tendon ruptures who underwent reconstruction using an Achilles tendon allograft performed by a single fellowship-trained surgeon between 2012 and 2024 utilizing the BRAIDS Technique (Biceps Reconstruction with Achilles Interposition and Durable Suture). All patients had a minimum clinical follow-up of 12 months. Patient-reported outcome measures included the Quick Disabilities of the Arm, Shoulder and Hand (QuickDASH) score and the American Shoulder and Elbow Surgeons (ASES) Self-Care subscore. Additional survey-based data were collected to assess patient satisfaction, willingness to undergo the procedure again, perceived symptom resolution, and global functional improvement using a 7-point Likert scale. Cosmetic satisfaction and scar visibility were also evaluated. Objective functional testing was performed using isokinetic dynamometry to assess peak torque and work fatigue in both flexion and supination, comparing the reconstructed arm to the contralateral side. Paired t-tests were used to assess differences, with statistical significance defined as $p < 0.05$.

RESULTS:

Fourteen male patients were included, with a mean age of 46.4 years (standard deviation [SD] 8.0; range 29–58), and mean body mass index (BMI) of 32.3 kg/m² (SD 5.3; range 24–42). The average time from injury to surgery was 47.0 weeks (SD 31.5; range 12–96), and mean follow-up duration was 47.1 months (SD 45.3; range 13–157). At final follow-up, the mean QuickDASH score was 3.57 ± 4.61, and the mean ASES Self-Care score was 97.4 ± 6.16. All patients (100%) indicated that their current condition was satisfactory, and 93% stated they would undergo surgery again. All patients reported meaningful functional improvement postoperatively. Specifically, 21.4% described themselves as “a very great deal better,” 50.0% as “a great deal better,” and 28.6% as “a good deal better.” No patients reported a neutral or worsened condition. Complete symptom resolution was reported in 71.4% of patients.

Eight patients (57.1%) noted a visible deformity of the biceps muscle: 28.6% noted mild asymmetry, and 28.6% reported moderate asymmetry. Despite this, 64.3% of patients stated they were either satisfied or very satisfied with the appearance of their arm. Visible scarring was reported in 93% of patients, with 71.4% expressing satisfaction or high satisfaction with scar appearance.

Isokinetic testing revealed no significant difference in flexion peak torque between the injured and contralateral arms (33.4 ± 10.8 vs. 33.6 ± 13.8 ft-lb; $p = 0.943$). For supination peak torque, the injured arm showed a trend toward lower strength compared to the contralateral arm, though this did not reach significance (4.19 ± 1.53 vs. 5.11 ± 1.61 ft-lb; $p = 0.077$). Measures of muscular endurance showed no significant differences in flexion or supination fatigue between the operative and contralateral arms.

DISCUSSION AND CONCLUSION:

Distal biceps tendon reconstruction using Achilles tendon allograft demonstrated excellent long-term functional outcomes and high patient satisfaction when performed in the setting of chronic tendon rupture. All patients in this cohort reported meaningful improvement, minimal disability, and a high willingness to undergo the procedure again. Although cosmetic deformity and visible scarring were frequently noted, most patients remained satisfied with their appearance. Objective isokinetic testing confirmed the restoration of flexion strength on the operative arm. These results support the use of tendon allograft reconstruction as a reliable and durable surgical option for patients presenting with chronic distal biceps tendon injuries.

Table 1: Isokinetic Strength and Endurance Testing Results

Measure	Injured Arm (Mean ± SD)	Contralateral Arm (Mean ± SD)	p-value
Flexion peak torque (ft-lb)	33.4 ± 10.8	33.6 ± 13.8	0.943
Supination peak torque (ft-lb)	4.19 ± 1.53	5.11 ± 1.61	0.077
Flexion work deficit	0.96 ± 53.87	-31.88 ± 105.40	0.137
Supination work deficit	-9.70 ± 49.78	-15.90 ± 34.03	0.798