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Delayed repair of distal biceps tendon ruptures is successful: a case-control study

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Background: The literature has shown an increased complication rate with a delay to surgical repair of acute distal biceps tendon ruptures; however, little has been documented regarding the outcome of delayed repairs. This case-control study compared a study cohort of delayed (>21 days) distal biceps tendon repairs with a control cohort repaired acutely (<21 days).

Methods: Sixteen delayed repair cases were reviewed and matched with acute controls (1:3) based on repair technique, age, and workers' compensation status. The delayed cohort was reviewed and completed isometric strength testing and the Disabilities of the Arm, Shoulder and Hand questionnaire; Patient-Rated Elbow Evaluation; and American Shoulder and Elbow Surgeons elbow questionnaire.

Results: The time to surgery averaged 37 ± 12 days in the delayed cohort versus 10 ± 6 days in the acute cohort. Complications occurred in 63% of patients in the delayed cohort versus 29% in the acute cohort ($P = .04$); however, 90% of the delayed cohort's complications consisted of transient paresthesias. Follow-up scores on the Patient-Rated Elbow Evaluation, Disabilities of the Arm, Shoulder and Hand questionnaire, and American Shoulder and Elbow Surgeons elbow questionnaire were not statistically different between cohorts ($P > .37$, $P > .22$, and $P > .46$, respectively).

Conclusions: Despite a high rate of initial complications, patients treated with distal biceps tendon repair after a delay (>21 days) can expect similar functional outcomes to those treated acutely.

Level of evidence: Level III; Case-Control Design; Treatment Study

Keywords: Distal biceps tendon; distal biceps tendon repair; one-incision technique; two-incision technique; complications; delayed repair

Distal biceps tendon ruptures are not always promptly recognized or referred appropriately and may present to surgeons after a delay. Patients also may not seek timely treatment, believing that their injury is a muscle strain. Previous reports have noted increased complications for patients with a delay to primary surgical repair. Kelly et al[8] reported on the complication rate after a modified 2-incision repair, classifying acute repairs as those performed less than 10 days after injury; subacute, between 10 and 21 days after injury; and delayed, 22 days or more after injury. They reported an increase in the complication rate from 24% for acute repairs to 41% for delayed repairs. Bisson et al[2] reported the complication rate increased from 20% to 40% after 15 days ($P = .16$), and Cain et al[3] noted an increase in the complication rate from 30% to 46% ($P = .28$) after 4 weeks in a large retrospective series.

Surgeons treating patients with distal biceps tendon ruptures presenting after a delay may be hesitant to operate in

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light of the higher complication rate and difficult dissection in the antecubital fossa. The dissection in delayed cases becomes more difficult as the tunnel for the biceps tendon closes and fills with scar tissue, as described by Kelly et al.[8] Although the reported complication rate is certainly higher with delayed treatment, it has been our experience that good results, strength recovery, and patient satisfaction can be obtained with delayed repair.

To clarify the outcomes of delayed distal biceps tendon repair, we reviewed and compared our experience with patients treated less than 21 days (acute) and greater than 21 days (delayed) after the original injury. The primary objective in this case-control study was to compare functional outcomes and strength, and the secondary objective was to compare the complication rate in a cohort of distal biceps tendon ruptures surgically repaired acutely (<21 days from injury) with a cohort with delayed repair (>21 days from injury). We hypothesized that the majority of the complications associated with delayed distal biceps tendon rupture repair would be relatively minor and transient and that longer-term outcomes would resemble those of patients treated acutely.

Methods

This study compared a retrospective cohort of delayed distal biceps repairs with a prospective acute repair group, for which results have been previously published.[5]

Patient recruitment

The study cohort consisted of a retrospectively collected consecutive series of distal biceps tendon ruptures surgically repaired in a delayed (>21 days) fashion between 2008 and 2013 at an upper extremity referral center. Patients who required a tendon graft reconstruction were excluded. Once the delayed cohort was identified, patients were contacted to return for physician review and functional testing.

Delayed study cohort

Forty-three patients met the inclusion criteria, having a delayed repair greater than 21 days from the time of injury; of these, 19 were lost to follow-up or did not return 2 telephone calls. In addition, 8 declined to participate in the study, leaving 16 participants at final follow-up. The primary surgical repair technique was at the discretion of 5 fellowship-trained upper extremity surgeons: either a 1-incision repair using 2 Mitek G4 Super Anchors (Mitek Surgical Products, Norwood, MA, USA) or a 2-incision repair using a bone tunnel and 2 No. 2 Ethibond sutures (Ethicon, Somerville, NJ, USA).[6] If the physical examination findings were uncertain or the delay was prolonged, soft tissue imaging in the form of magnetic resonance imaging in the flexed, abducted, and supinated view was performed.[4] In some patients, an ultrasound was used to determine the level of the distal biceps tendon injury and degree of retraction. It is our practice to prescribe indomethacin, 25 mg orally 3 times a day, for 3 weeks after distal biceps repair; however, no attempts were made to monitor compliance.

Case-control cohort

We matched the delayed study cohort with a control cohort that had been treated acutely (<21 days from injury) with a similar surgical technique as part of a previously published prospective randomized controlled trial.[5] These patients were treated by the same surgeons, using the same surgical technique,[6] with randomization to a 1- versus 2-incision technique between 2001 and 2008. Case-control matching was performed manually to control for the variables of technique (1 incision vs 2 incisions), age, and workers' compensation status. On the basis of our large prospective sample size, we elected to match 3 acute repairs to every 1 delayed repair; this enabled a more representative sample of the controls.

Outcome measures

Study follow-up included several outcome scores. The Disabilities of the Arm, Shoulder and Hand (DASH) questionnaire is a 30-question patient outcome measure for which each item is scored from 1 to 5; the completed score has a range of 0 to 100, with higher scores denoting greater disability and symptoms.[1] It has been suggested that a 15-point difference indicates a meaningful change in symptoms.[1] The DASH sport/arts module score and the DASH work module score are similarly graded from 0 to 100, with higher scores for patients unable to fulfill their work tasks.

The Patient-Rated Elbow Evaluation (PREE) is an elbow-specific outcome questionnaire that measures pain and disability. Patients rate their pain and functional difficulty from 0 to 10 (with higher numbers for greater pain and disability); the total score is calculated out of 100.[12]

The American Shoulder and Elbow Surgeons (ASES) elbow questionnaire is a standardized assessment form developed by elbow surgeons and includes 3 sections: For the pain score, patients rate their pain from 0 (no pain) to 10 (worst pain ever) during 5 scenarios; these ratings are summed to obtain a maximum pain score of 50. The elbow function score asks patients to rate their inability to perform 12 daily tasks; for each task, a score of 0 indicates patients are unable to do the task whereas 3 indicates no difficulty. Last, the subjective patient satisfaction score from 0 (not at all satisfied) to 10 (very satisfied) was recorded.[9]

Strength testing

Supination and elbow flexion strength for both studies was measured using a Biodex System 3 Pro (Biodex Medical Systems, Shirley, NY, USA). Isometric supination strength was tested with the forearm in a neutral position, and isometric elbow flexion strength was tested with the elbow at 90°; the best effort of 3 trials was recorded, as was done for the prospective randomized controlled trial.[5] The order of testing was randomized, and the strength data were reported as a percentage of the unaffected side. Study personnel were trained to perform the testing in a standardized fashion.

Subjective measures

Subjective satisfaction was assessed using the Single Assessment Numeric Evaluation (SANE). In addition, sensation in the distribution of the lateral antebrachial cutaneous nerve (LACN) was assessed, and patients were asked in an interview about return to