ORIGINAL ARTICLE

Is nonoperative management of partial distal biceps tears really successful?

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Background: The current treatment of partial distal biceps tears is a period of nonoperative management, followed by surgery, if symptoms persist. Little is known about the success rate and outcomes of nonoperative management of this illness.

Methods: We identified 132 patients with partial distal biceps tears through an *International Classification of Diseases, Ninth Revision* code query of our institution's database. Patient records were reviewed to abstract demographic information and confirm partial tears of the distal biceps tendon based on clinical examination findings and confirmatory magnetic resonance imaging (MRI). Seventy-four patients completed an outcome survey.

Results: In our study, 55.7% of the contacted patients who tried a nonoperative course (34 of 61 patients) ultimately underwent surgery, and 13 patients underwent immediate surgery. High-need patients, as defined by occupation, were more likely to report that they recovered ideally if they underwent surgery, as compared with those who did not undergo surgery (odds ratio, 11.58; $P = .0138$). For low-need patients, the same analysis was not statistically significant ($P = .139$). There was no difference in satisfaction scores between patients who tried a nonoperative course before surgery and those who underwent immediate surgery ($P = .854$). An MRI-diagnosed tear of greater than 50% was a predictor of needing surgery (odds ratio, 3.0; $P = .006$).

Conclusions: This study has identified clinically relevant information for the treatment of partial distal biceps tears, including the following: the failure rate of nonoperative treatment, the establishment of MRI percent tear as a predictor of failing nonoperative management, the benefit of surgery for the high-need occupational group, and the finding that nonoperative management does not negatively affect outcome if subsequent surgery is necessary.

Level of evidence: Level IV; Case series; Treatment study
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The national incidence of rupture of the distal tendon of the biceps brachii muscle is estimated to occur at a rate of 2.55/100,000 patient-years.[7] Distal biceps tears occur commonly with a large eccentric load on the muscle[8] and occur most commonly in middle-aged men, although the injury does occur in other age groups and in women.[5,8] Patients with

complete tears typically present with pain in the antecubital fossa, weakness on elbow supination and flexion, a visible and palpable defect of the tendon, and deformity of the biceps muscle contour.[3,9] In patients with complete tears, it is widely accepted that surgery leads to optimal recovery, although in populations that are unhealthy or have a low demand on the biceps, a nonoperative approach is also an option.[3]

Partial distal biceps tears may present with a well-defined injury or as an insidious onset of pain.[1] When presenting with a well-defined injury, partial tears may mimic signs and symptoms of a complete rupture, the primary difference being that the biceps tendon remains palpable in the antecubital fossa.[2] In cases of insidious onset, the underlying pathogenesis may represent chronic degenerative tendinosis.[6,10] Typically, the diagnosis is confirmed with advanced imaging modalities such as magnetic resonance imaging (MRI).[5]

Often, initial treatment of a partial tear consists of a period of rest and avoidance of aggravating activity combined in some cases with braces and steroid injection.[1,2,6,10] For patients who remain symptomatic despite a period of nonoperative management, surgery may be indicated. Surgical repair of partial distal biceps tears, which consists of conversion of a partial tear to a complete tear, débridement of the degenerative tendon substance, and subsequent reattachment to the radial tuberosity, has been shown to be an excellent intervention in terms of pain relief.[3,8,13] Although the indications for surgical intervention for a complete tear of the distal biceps tendon are well identified, the operative indications for a partial distal biceps repair are not well defined.[12] Most of the current literature on partial distal biceps tears consists of case series of patients in whom nonoperative management failed and who underwent surgical repair. Because of the method by which these patients have been identified, it is unclear what percentage of patients with partial distal biceps tears may be successfully treated nonoperatively.

The purpose of this study was to identify a large patient pool of partial distal biceps tears and determine the percentage of patients in whom nonoperative treatment fails. Secondary goals included performing a comparison of outcomes in patients treated nonoperatively versus operatively, determining whether high-need patients (as defined by occupation) benefited more from surgery than low-need patients, and assessing the predictive capacity of an MRI-diagnosed tear greater than 50% as an indication for surgery.

Materials and methods

We retrospectively identified and reviewed patients with partial distal biceps tears from January 1, 2010, to September 31, 2015. Patients were identified by a query of our institutional billing database for the diagnosis of a partial tear of the distal biceps using *International Classification of Diseases, Ninth Revision* code 841.8 (sprains and strains of other specified sites of elbow and forearm). Because this diagnosis code is not specific to distal biceps tears, this large pool of patients included other injuries such as ulnar collateral ligament tears, brachialis strains, complete biceps tears, biceps tendinitis, and triceps tears, among others. Patients with complete biceps tears and other non-biceps injuries were eliminated from the patient pool by review of chart notes and radiology reports. Patients were identified as having partial distal biceps tears based on a combination of physical examination findings (pain at the distal biceps tendon, pain localized to the distal biceps tendon with flexion and/or supination) and confirmatory results of MRI showing incomplete tearing of the distal biceps tendon. Additional exclusion criteria were age younger than 18 years and a history of biceps tendon surgery.

MRI-diagnosed partial tears were based on the treating physician's assessment as well as the radiologist's interpretation. In the case of a discrepancy between the treating physician and the radiologist, the treating physician's diagnosis was used. The severity of biceps tendon partial tearing was categorized as a partial tear with less than 50% tendon involvement or a partial tear with greater than 50% tendon involvement. Further chart review was performed to abstract demographic information, date of injury, and date of initial physician evaluation, as well as mechanism of injury, operative or nonoperative treatments, and clinical follow-up results. The operative report was reviewed to determine the surgical approach and the fixation technique.

Patients were split into 3 groups based on their surgical treatment. Nonoperative patients did not pursue surgery, failed nonoperative patients pursued a nonoperative course for a minimum of 7 weeks (42 days) from the date of injury, and immediate-surgery patients underwent surgery less than 42 days after the date of injury. Patients undergoing immediate surgery did so at the discretion of the treating surgeon.

The type of injury was identified by 3 covariates as determined by chart review. The injury was designated as "identifiable" if the patient could remember an inciting incident correlated to a specific day or particular event. Patients were categorized as high need or low need as determined by the demands of their job. A high-need job was defined as a job that required either heavy lifting (foreseeably >25 kg) or repeated elbow flexion and extension. Any other job was considered low need, including patients who were retired.

We obtained final clinical follow-up results by contacting patients and administering a phone survey. Patients were asked about any present symptoms of pain in the antecubital fossa of the elbow (at rest or with activity), whether they underwent subsequent surgery for the distal biceps tendon in the interim, and their overall assessment of their elbow function. Patients' grading of their elbow function was categorized as follows: much better, somewhat better, no change, or worse. We used a patient-rated questionnaire, the Patient-Rated Elbow Evaluation (PREE), to quantify outcomes. The PREE has 3 subscales—pain, specific activities, and usual activities—resulting in 2 subscores: pain and function. The pain and function scores are totaled to give the PREE total. The PREE has been shown to have high internal validity and structural validity, as well as a large effect size.[14] Evidence has been shown to support the validity and sensitivity to change of the PREE.[14]

Our primary endpoint was assessed by determining the percentage of patients in whom nonoperative management was tried and failed. This was achieved in the patients who were able to be contacted and could state whether they had pursued surgery by a different provider. Patients who underwent surgery within 42 days (6 weeks) of the injury were excluded from this analysis because 42 days was not considered a sufficient nonoperative course. Secondary goals were assessed using Fisher exact test analysis on a dichotomized Likert