Simultaneous Bilateral Distal Biceps Tendon Rupture during a Preacher Curl Exercise
A Case Report

Andrew S. Rokito, M.D., and Ilya Iofin M.D.

Abstract
Complete rupture of the distal biceps tendon is a rare injury, the overwhelming majority occurring in the dominant arm of males during the fourth to sixth decades of life. Simultaneous bilateral rupture of the distal biceps tendon is an extremely rare occurrence, with only three cases reported in the literature. This unusual injury occurred in a recreational weightlifter during a preacher curl exercise. In this particular case, a 6-week delay in presentation necessitated a staged procedure in which a primary repair was feasible in one elbow, while reconstruction using allograft tissue was required in the contralateral elbow. Satisfactory results for both elbows were achieved, with return to weightlifting by one year following surgery.

Complete rupture of the distal biceps tendon is a rare injury. Overall, there are fewer than 500 cases reported in the literature. These injuries usually occur in males in their fourth to sixth decade of life and are the result of a sudden, forceful eccentric contraction of the biceps muscle. Only four cases involving females have been reported. The dominant extremity is more commonly involved. The literature includes three reports of concomitant bilateral complete distal biceps tendon ruptures and five reports of asynchronous bilateral ruptures. The current case report is of simultaneous distal biceps tendon ruptures during a preacher curl exercise.

Case Report
A 51-year-old, right-hand dominant recreational weightlifter, presented with a chief complaint of bilateral elbow pain 6 weeks following injury. While rapidly performing a preacher biceps curl with a 90-pound barbell, the patient experienced a painful “pop” in both elbows. He was unable to continue exercising due to pain. Over the next several days both elbows became swollen, with black and blue discoloration extending into the forearms. The patient reported having no elbow problems prior to this injury, there was no history of any medical problems, and he denied any use of anabolic steroids. He reported that he was very physically active and had been involved in recreational weightlifting for several years. Prior to presentation at our institution, the patient had seen his primary care physician and two other orthopaedic surgeons.

Visual inspection of both elbows revealed mild residual swelling within the antecubital fossae and ecchymosis overlying the proximal lateral forearm. There was obvious proximal retraction of the biceps musculature bilaterally. This deformity was accentuated with resisted elbow flexion and was more pronounced on the left side. In the right elbow, there was tenderness directly over the biceps tendon, which was palpable within the fossa; the tendon could not be palpated within the fossa; rather, it could be identified more proximally in the upper arm, at the distal end of the retracted biceps muscle. Active range of motion of both elbows consisted of 0° to 135° of flexion and 85° of both forearm supination and pronation. Manual muscle testing of both elbows was associated with pain and weakness on resisted elbow flexion and forearm supination.

Plain radiographs of both elbows were normal. Magnetic resonance image (MRI) examination of both elbows revealed avulsion of the biceps tendon from the radial tuberosity, with approximately 2 cm of retraction in the right elbow (Fig. 1).

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and 5 cm of retraction in the left elbow (Fig. 2).

Staged surgical procedures were performed. It was decided to first operate on the right elbow. The right was the patient’s dominant side, and it was felt that a primary repair was possible given that the clinical examination and the MR images indicated less retraction was present when compared to the left elbow.

The right distal biceps tendon was repaired primarily to the radial tuberosity at 7 weeks following the injury utilizing a modified Boyd-Anderson approach. Surgical exploration revealed the tendon to be completely avulsed from the radial tuberosity using minimal retraction, as it was held by the lacertus fibrosus. Two No. 2 solid core sutures were weaved through the distal tendon using a modified Krackow stitch (Fig. 3). The tendon was then repaired directly to a trough in the tuberosity, tying the sutures over a bony bridge. The elbow was immobilized in a long-arm plaster splint for 3 weeks. This was followed by the use of a hinged brace with a 30° extension limit for an additional 3 weeks. Full range of motion was allowed at 6 weeks, with strengthening exercises beginning at 8 weeks.

Surgery for the left elbow was performed at 20 weeks.
following the injury. Once again, a modified Boyd-Anderson approach was utilized. The biceps tendon was found to be completely retracted along with the muscle to about the midportion of the upper arm. The remaining tendon was only a very small stump with fatty degeneration. Reconstruction using an Achilles tendon allograft, as described by Sanchez-Sotelo and colleagues, was performed.\(^1\) The graft was secured to a trough in the radial tuberosity using two No. 2 solid core sutures placed with a modified Krackow stitch. The proximal end of the graft was secured to the native distal biceps stump and adjacent biceps muscle with interrupted sutures (Fig. 4). As with the right side, the left elbow was initially immobilized in a long-arm splint for 3 weeks. This was followed by the use of a hinged elbow brace with a 30° extension splint for an additional 3 weeks. Strengthening exercises were initiated at 12 weeks.

The patient returned to recreational weightlifting at 6 months following the allograft reconstruction. At that time, he reported that he was pain-free. He had symmetrical range of motion of both elbows, consisting of 0° to 135° of flexion, with 85° each of forearm supination and pronation. There was normal contour of the biceps musculature, which appeared symmetrical when both sides were compared. The patient reported that both elbows felt the same as far as strength was concerned with respect to weightlifting.

**Discussion**

Rupture of the distal biceps tendon is a relatively rare injury that occurs when there is an unexpected, forceful eccentric contraction of the biceps muscle.\(^4\) The biceps is both a strong flexor and supinator of the elbow. Nonoperative treatment of distal biceps tendon rupture results in a loss of 30% of flexion strength and 40% of supination strength.\(^5\) Direct primary repair usually can be accomplished within the first 3 weeks following injury. Beyond 3 weeks, there is commonly significant retraction of the tendon into the muscle, and direct repair is often not feasible.

In this case, the patient presented to us 6 weeks following injury. Based upon the clinical examination and MRI evaluation, it was determined that direct repair of the right distal biceps tendon might be possible, while the left elbow would require, more than likely, reconstruction with a graft. Consequently, we decided to stage the procedures, proceeding first with the right side. This approach would allow the patient to have complete use of one arm for activities of daily living while convalescing from surgery. Fortunately, direct repair was accomplished as there was only minimal retraction of the tendon held by the lacertus fibrosus. Reconstruction of the retracted left biceps tendon followed once the period of immobilization and bracing of the right elbow had passed.

Primary repair of distal biceps tendon ruptures yields satisfactory subjective and objective results.\(^6\) Several investigators have reported reconstruction of chronic distal biceps tendon rupture using a graft.\(^11,16\) Kaplan and coworkers reported satisfactory results using autogenous fascia lata combined with a ligament augmentation device for chronic distal biceps tendon rupture.\(^16\) Strength recovery using this technique, however, was not predictable. More recently, Sanchez-Sotelo and associates reported on the use of an Achilles tendon allograft for chronic distal biceps tendon rupture. In the four patients reported who underwent this technique, satisfactory subjective and objective outcomes were achieved. The strength of flexion and supination was comparable with that on the contralateral side in two patients and was slightly decreased in the other two.\(^13\)

In summary, this case represents an unusual injury of simultaneous distal biceps tendon rupture during weightlifting. Only three other cases of simultaneous distal biceps tendon rupture have been reported in the literature.\(^6,8\) This injury occurred as a result of a sudden, forceful eccentric muscle contraction during a preacher curl exercise. Timing of surgery for these injuries is very important, as primary repair is usually best accomplished within the first 3 weeks following injury. In this case, due to delayed presentation for treatment, direct primary repair for the left side was not possible. Staged surgery was performed and satisfactory outcomes achieved for both elbows.

**Disclosure Statement**

None of the authors have a financial or proprietary interest in the subject matter or materials discussed, including, but not limited to, employment, consultancies, stock ownership, honoraria, and paid expert testimony.

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