Partial rupture of the distal biceps tendon

Dimitris G. Vardakas, MD, Douglas S. Musgrave, MD, Sokratis E. Varitimidis, MD, Felix Goebel, MD, and Dean G. Sotereanos, MD, Pittsburgh, Pa

We report on 7 cases of partial rupture of the distal biceps tendon. The mean patient age was 52 years (range, 38-58 years). There were 5 men and 2 women. The dominant arm was affected in all 7 patients. Pain was the chief complaint in all patients. Immobilization and physiotherapy were attempted in all patients, and 4 had at least 1 local steroid injection. No patient improved from the conservative treatment. All patients eventually underwent surgical debridement and reattachment of the biceps tendon with use of a 1-incision technique with suture anchors. After a mean follow-up of 31 months (range, 25-44 months), all patients reported a significant decrease in their pain. No complications were noted. (J Shoulder Elbow Surg 2001;10:377-9.)

INTRODUCTION

Partial rupture of the distal biceps tendon has rarely been reported. Only 20 cases have been reported in the literature, and for 10 of them, no details were available regarding treatment.2,5-8,12,13 The lack of a traumatic event in many of these patients and the difficulty in diagnosing such a lesion may be reasons for the small number. Since the advent of magnetic resonance imaging (MRI), more accurate diagnosis is possible. Pain in the antecubital fossa with resisted supination is the most common finding. Active flexion and supination strength is usually limited by pain, but swelling is not always present. MRI is capable of quantifying the extent of the tear, as well as tenosynovitis, tendinitis, or bursitis, which may accompany the tear.6,7 The treatment is initially conservative and includes nonsteroidal anti-inflammatory drugs, splinting, and physiotherapy. Some physicians have used and have recommended local corticosteroid injections. Surgical treatment is reserved only for refractory cases.2,6

MATERIALS AND METHODS

Seven right hand-dominant patients, 5 men and 2 women, presented with symptoms and clinical signs of distal biceps tendinitis. The mean age of these patients was 52 years (range, 38-58 years). The dominant extremity was involved in all. Five reported no history of an acute event and did not recall when the symptoms began. One patient reported an unexpected large load applied to the flexed arm, and one was injured while attempting to prevent a fall. On presentation, all of the patients complained of pain in the antecubital fossa and 4 of them had limited active range of motion in flexion and supination due to painful inhibition. Two patients had slight swelling in the antecubital fossa. On physical examination, tenderness with palpation of the distal biceps tendon was present in all patients, as well as pain with resisted flexion and supination. Plain radiographs showed no abnormalities. All patients underwent MRI scans. Varying degrees of partial rupture on the undersurface of the biceps tendon insertion were noted in all 7 (Figure 1). Soft tissue swelling, tendon degeneration, and tenosynovitis were present in all patients. Two patients had MRI evidence of an enlarged bicipital bursa and edema in the tissues surrounding the tendon. Conservative treatment with immobilization, anti-inflammatory drugs, and physiotherapy was unsuccessful in all 7. Four of them had at least 1 local injection of steroid. Operative treatment was performed after a mean symptom and conservative treatment duration of 9.5 months (range, 7-14 months). The mean follow-up after surgery was 31 months (range, 25-44 months).

At the final follow-up, patients were questioned about their activity level, job status, and pain relief. Elbow range of motion was compared with that of the uninjured arm. Static muscle testing was performed with use of a BTE Work Simulator (Baltimore Therapeutic Equipment, Hanover, Md), and each value was expressed as a percentage of the uninjured side.

Operative technique

A single, S-shaped, anterior incision was centered over the antecubital fossa, facilitating a modified Henry’s approach. The proximal limb of the incision is lateral to the biceps tendon, and the distal limb is just medial to Henry’s mobile wad. The lateral antebrachial cutaneous nerve was identified and retracted laterally. The biceps tendon was exposed and traced distally to the insertion at the radial tuberosity. The lacertus fibrosus was found to be intact in all cases. The radial attachment of the supinator was not released. The radial nerve and posterior interosseous nerve were not exposed; instead, they were protected by gentle retraction and, most important, by keeping the forearm supinated at all times. The radial recurrent vessels were ligated to facilitate retraction, which allowed safe distal exposure of the tuberosity. In all cases the tendon had significant degeneration and softening at the insertion site, but was in partial continuity with the radial tuberosity. The affected portion of the tendon varied between 60% and...
90% of the tendon diameter. In 2 cases a synovial cyst found attached to the tendon was excised. The tendon was released from the insertion, and the degenerated portion trimmed to normal tendon substance. Approximately 1 cm of tendon was excised in all cases. Thick bursal tissue was preserved to reinforce the repair after tendon reattachment. The tuberosity was then decorticated with a small, motorized burr. Two 5.2-mm Fastin (Mitek/Ethicon/Johnson and Johnson Inc, Norwood, Mass) suture anchors with number 2 non-absorbable sutures were inserted into the tuberosity. The suture tails were placed into the distal 3 cm of the tendon with a sliding Kessler stitch (Figure 2). The tendon was advanced to bone with the arm flexed 90°. The remaining periosteum, tendon sheath, and bursal tissue were sutured to the repaired stump with an absorbable suture for reinforcement. After wound closure, the arm was placed in a well-padded posterior plaster splint that maintained the elbow in 90° of flexion and the forearm in 20° of supination. A dynamic, hinged extension block brace was applied at the first postoperative visit, approximately 10 days postoperatively, in 45° of extension. This dynamic extension block brace uses elastic bands to allow assisted flexion of the elbow. It was kept in place for 6 weeks. Range of motion was advanced to full extension progressively starting at the third week. Resisted supination and flexion were not allowed for 12 weeks after the procedure, but light daily activities were allowed 2 months postoperatively. Strengthening exercises were begun at the fourth month.
RESULTS

The distal biceps tendon was successfully reattached to the radial tuberosity in all 7 patients. All returned to their preinjury level of activity and employment by 6 months after surgery. Two of the patients were employed as heavy laborers. All patients completed a subjective questionnaire and were pleased with the result. All reported that they would undergo the surgery again.

Range of motion was normal in 6. One patient lacked 10° of extension and 10° of pronation compared with the uninjured side.

All of the repaired arms were found to be stronger in flexion and supination than the uninjured side by BTE Work Simulator (Baltimore Therapeutic Equipment) testing at the final follow-up. The elbow averaged 8.1% more flexion strength and 1.9% more supination strength for the repaired elbow than for the uninvolved elbow. There were no late complications, and serial radiographs showed no evidence of heterotopic ossification or change in the position of the suture anchors.

DISCUSSION

Partial ruptures of the distal biceps tendon are generally not associated with a traumatic event. Four of 10 reported cases in the literature had a history of trauma.2,12,13 In the current study only 2 patients had a traumatic event. The mean age of patients with a partial rupture of the distal biceps tendon is 54 years in the literature and 52 years in the current study. This may be consistent with a degenerative etiology.2,4,8,9 Furthermore, a hypovascular zone in the distal biceps tendon just proximal to its insertion into the radial tuberosity and an impingement mechanism between radius and ulna during pronation have recently been proposed as causative factors.14 Before the advent of MRI, partial distal biceps tendon tears went undiagnosed radiographically. MRI is capable of showing the extent of the tear, as well as tenosynovitis, tendinitis, or bursitis, which may accompany the tear.6,7

The most common clinical presentation is pain in the antecubital fossa, which may or may not be attributable to a specific traumatic event. Flexion and supination strength is usually limited by pain, and swelling may not be present. Physical examination demonstrates tenderness at the distal biceps tendon and pain with resisted flexion and supination. Conservative treatment was successful in 4 of 10 cases previously reported.5,8

In our study, after an average period of 9.5 months (range, 7-14 months) of conservative treatment, surgical treatment was undertaken because conservative treatment failed in all of the patients. We used a 1-incision technique with excision of necrotic tendon to normal tendon substance. We believe good debride-ment and strong insertion are obtained by detaching the tendon and then reattaching it with use of bone suture anchors. This technique has proved successful in treating acute and chronic complete ruptures of the distal biceps.15 The repaired elbows demonstrated 8.1% more flexion strength and 1.9% more supination strength in comparison with the uninvolved, nondominant arm. In 2 previous studies in normal individuals the difference between dominant and nondominant strength was 3% and 6%, respectively, for elbow flexion and 8% and 10%, respectively, for supination.1,11 In other studies, after operative repair of complete distal biceps tendon ruptures, the average flexion strength and supination strength for the dominant repaired elbow were 96% to 110.9% and 94.7% to 105%, respectively, compared with the uninvolved nondominant elbow.3,10,15 Furthermore, no complications were encountered in this series.

We believe that surgical excision of degenerative tendon through a single incision with reattachment using bone suture anchors is an excellent method of treatment for painful partial distal biceps rupture.

REFERENCES