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Rupture of the Distal Biceps Tendon in a Collegiate Football Player: A Case Report

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Objective: To provide health care personnel with guidelines for the management of a distal biceps tendon rupture.

Background: Traumatic ruptures of the biceps tendon are rare, but serious, and usually involve the long head of the proximal insertion. Ruptures of the distal tendon account for only 3% of all biceps tendon ruptures. A history of tendinitis, overuse, or anabolic steroid abuse may predispose tendons to rupture. Surgical repair, followed by a comprehensive rehabilitation program, is indicated to regain full strength and range of motion in both flexion and supination.

Differential Diagnosis: Rupture of the distal head of the biceps brachii muscle at the insertion on the radial tuberosity.

Treatment: After the injury, the athlete continued to compete for the remainder of the collegiate football season. He then underwent surgery to repair the tendon at its insertion. Postoperatively, the athlete was immobilized in a cast and then a brace to prevent any movement of the muscle. Rehabilitation proceeded with isometric exercises and manual resistive exercises of the shoulder and wrist. At 16 weeks, the athlete was cleared for biceps curls and wrist supination. At 6 months, the athlete had regained full use of the muscle.

Uniqueness: This is a relatively rare injury, usually occurring at the proximal tendon insertion and in those who are middle aged (30 to 50 years old). Also, the surgical intervention in this case was delayed without detrimental effects to the patient.

Conclusions: This study shows that, while surgical intervention to repair a ruptured distal biceps tendon is necessary, appropriate conservative measures can be taken to allow surgery to be delayed without harm to the patient. The athletic trainer should be aware of how to recognize and treat this injury.

Key Words: biceps brachii, upper extremity, tendinitis

An extreme amount of stress is placed upon the biceps muscle in athletic competition. However, injuries to this muscle are not common, and, in fact, the rotator cuff and other muscles of the shoulder complex are more often injured.[1]

Traumatic ruptures of the biceps tendon are rare. When a rupture does occur, it usually involves the long head of the proximal insertion. Ruptures of the distal tendon account for only 3% of all biceps tendon ruptures.[2] Although the pathology of tendon ruptures is unknown, a history of tendinitis, overuse, or anabolic steroid abuse have been suspected to predispose tendons to rupture.[1] Tendon ruptures can occur at any age; however, most individuals injured are middle aged, ranging from 30 to 50 years of age.[1,3]

Anatomically, the biceps brachii muscle is the main flexor of the elbow and supinator of the forearm (Fig 1). It has a long head, which originates from the upper lip of the glenoid fossa, and a short head, which originates from the coracoid process of the scapula, with a distal insertion on the radial tuberosity (Fig 2).[4] The mechanism of injury to the biceps brachii is most commonly an eccentric contraction or resisted flexion of the elbow resulting from weight lifting or a fall onto an outstretched hand.[5] The athlete usually hears or feels a "pop," and the contour of the upper arm appears abnormal. The distal tendon is normally easily palpable at the antecubital space; the examiner's inability to palpate this tendon calls for immediate referral to an orthopaedist. Failure to recognize a tendon rupture and treat it appropriately could result in severe atrophy and loss of function.[3]

CASE REPORT

A 21-year-old male linebacker sustained a rupture of the distal biceps tendon during a collegiate football game. The athlete was an avid bodybuilder with well-defined musculature. He had no previous muscle pain in the biceps brachii muscle and no history of tendinitis. The athlete denied any anabolic steroid use. The athlete was hit from behind and knocked down onto his hands and knees, with the elbows slightly flexed. The opponent then landed on his back, which caused the biceps muscle to contract eccentrically to absorb the shock. The athlete felt a "pop" in his left arm and a period of extreme pain, which quickly subsided. The athlete continued to play and did not notify the medical staff of any injury. During a time out, the athletic trainer noticed a deformity in the left biceps muscle and referred the athlete to the team physician. The biceps muscle was contracted proximally and the distal tendon was not palpable. A rupture of the distal biceps tendon was diagnosed. The athlete had minimal pain at this time, and, although he had limited function, he was permitted to continue playing. After the game, the athlete was reevaluated and was placed in a sling and treated for pain.

A decision was made by the athlete, the athletic training staff, and the team physician to allow the athlete to continue

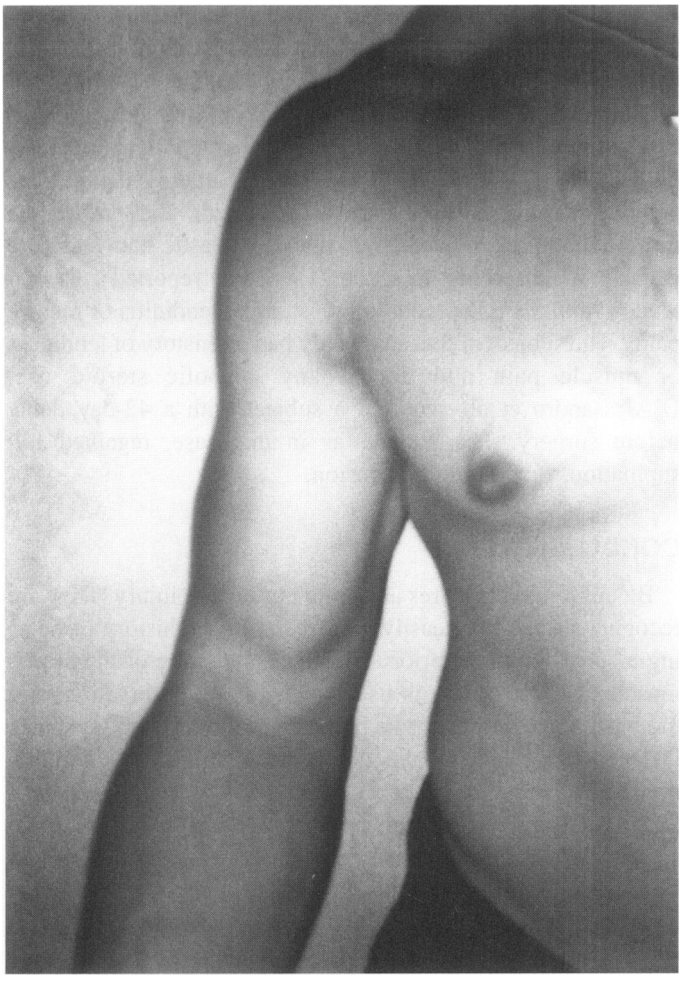

Fig 1. Superficial view of the biceps brachii muscle.

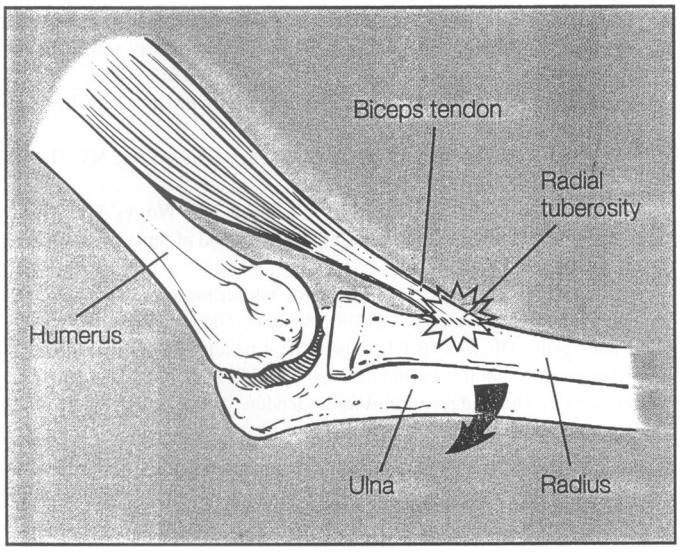

Fig 2. Anatomic illustration of the elbow joint and the insertion of the biceps brachii muscle on the radial tuberosity.

playing and finish the regularly scheduled season. Upon manual muscle testing, the brachioradialis muscle had sufficient strength to compensate for the biceps and to allow the athlete to perform as a linebacker. The athlete was kept out of contact during weekly practices and was taped to prevent elbow hyperextension during competition (Fig 3).

Two months postinjury, the athlete underwent a surgical repair of the biceps tendon using the two-incision technique described by Boyd and Anderson.[6] The tendon was found to be very short and frayed, and there was difficulty in moving the muscle distally. A tendon graft approximately 2.54 cm (1 inch) wide and 10.16 cm (4 inches) long was taken from the iliotibial band in the left thigh. The graft was inserted into the radial tuberosity and then sutured proximally to the existing biceps tendon, allowing 70° of elbow flexion.

The athlete was placed in a cast postoperatively for 6 weeks and was then placed in a brace with limited elbow extension. During this time, wrist exercises and isometric exercises of the forearm and shoulder were done. The athlete had minimal pain, which was managed with ice and electrical stimulation. At 12 weeks postoperatively, the patient was removed from the brace but was instructed not to stretch the arm into extension to avoid placing stress on the tendon graft. Manual resistive exercises for the shoulder in internal/external rotation, abduction, and adduction were performed, as well as wrist flexion, extension, radial deviation, supination, and pronation exercises. At 16 weeks, the athlete was cleared to perform biceps curls and wrist exercises. Wrist curls and supination were done with free weights, starting with minimal resistance, and slowly increasing resistance as pain and strength allowed. Six months after surgery, the athlete had regained full range of motion and full strength compared with the uninjured side. The athlete was released to play without restrictions (Fig 4).

DISCUSSION

Surgical repair of a ruptured biceps tendon is the preferred method of treatment.[1,4,6,7] Patients treated nonoperatively have

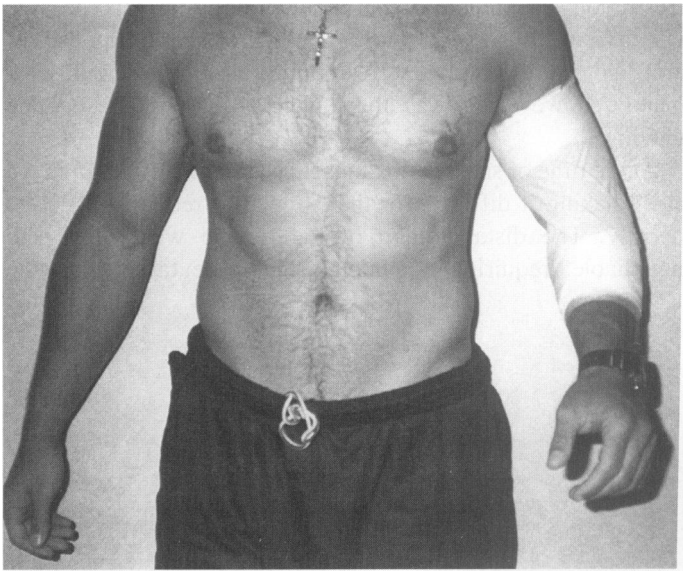

Fig 3. Prophylactic taping to prevent elbow hyperextension.

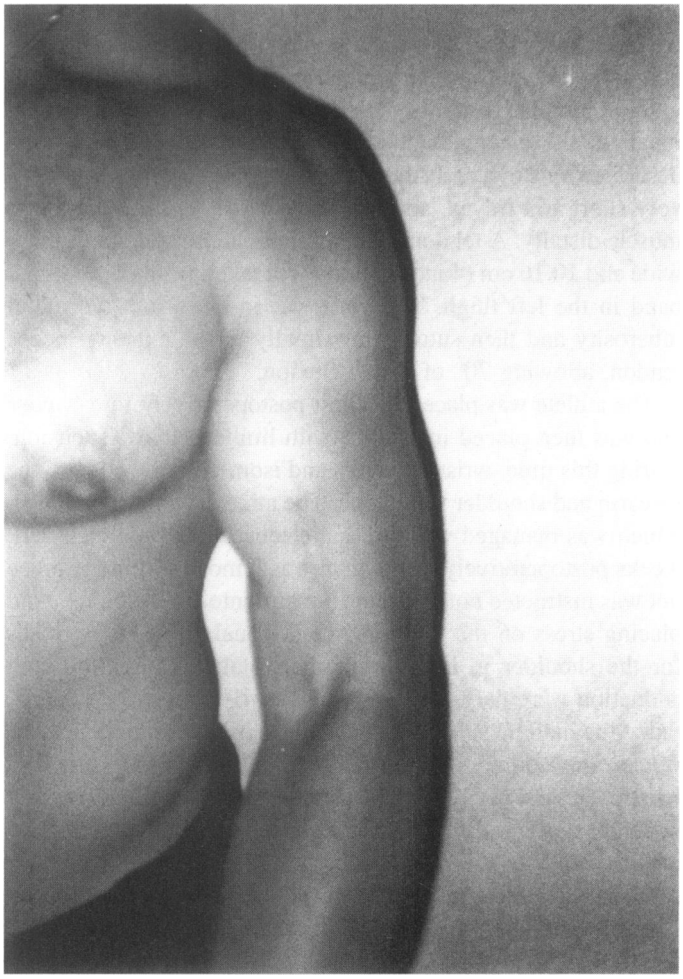

Fig 4. The patient 6 months after surgery.

shown deficits of 40% in supination strength and 30% in flexion.[3,7] In this case, the surgical repair was delayed to allow the athlete to complete the football season. The athlete changed his mind several times about delaying surgery due to pain and frustration. He reported that he did not feel that he was effective in his position due to the lack of strength in his left arm and that opponents were running through his arm. Ultimately, however, it was the athlete's decision to continue playing.

At the time of surgery, the muscle was contracted high in the arm, making it difficult for the surgeon to retract the muscle distally. The distal tendon of the muscle was frayed and nonpliable, requiring a tendon graft to be taken from the iliotibial band. The tendon had virtually exploded upon rupture, which suggests that this complication was not related to the surgical delay.

The cause of this patient's tendon rupture is unclear. In most cases of tendon rupture, there is a history of tendinitis, overuse, or anabolic steroid abuse. While anabolic-androgenic steroids greatly increase muscle mass and strength, they cause the muscle tendon to become stiff and less elastic and therefore capable of absorbing less energy.[1] Other reported cases of tendon ruptures followed a long history of tendinitis or muscle pain.[1] The subject of this case study had no history of tendinitis or muscle pain and denied any anabolic steroid use. D'Alessandro et al[7] reported a subject with a 42-day delay before surgery. The patient, as in this case, regained full supination, flexion, and extension.

CONCLUSIONS

Biceps tendon ruptures are a rare but serious injury. They are recognized relatively easily with the athlete's history of hearing a "pop" in the anterior arm after contraction of the biceps muscle. The deformity is usually visible on observation, and the biceps tendon cannot be palpated in the antecubital space. Delayed recognition of a tendon rupture can lead to complications; however, surgical repair should still be recommended.[8] Surgical repair versus nonoperative therapy is indicated to sustain full strength and range of motion in both flexion and supination. A comprehensive rehabilitation program must also be emphasized.

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