

Biceps and Triceps Ruptures in Athletes



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KEYWORDS

• Distal biceps tendon rupture • Triceps tendon rupture • Tendon injuries • Athletes elbow

KEY POINTS

- Operative management of complete distal biceps and triceps tendon ruptures is required in most cases, especially for active patients, laborers, and athletes wishing to return to competition.
- Full range of motion and strength can be achieved following anatomic, stable repair and appropriate rehabilitation of distal biceps tendon rupture; return to play after triceps tendon rupture repair can be expected, although rehabilitation may be considerably longer.
- Surgical approach and fixation method for repair of distal biceps tendon ruptures should be determined based on the experience and comfort level of the treating surgeon; however, the chosen technique should focus on anatomic reinsertion of the tendon with a construct that can tolerate early range of motion.

INTRODUCTION

Most commonly the result of a traumatic forceful eccentric load on a contracting muscle, rupture of the distal biceps or triceps tendons occurs infrequently even in athletes. Together, these injuries represent the most (biceps) and least (triceps) common tendon injuries about the elbow. Rupture of the distal biceps tendon results in weakness in flexion and more noticeably supination, whereas triceps tendon rupture results in profound weakness or inability to actively extend the elbow. Early diagnosis and prompt intervention are essential for a successful outcome for both injuries, especially in athletes. Acute anatomic surgical repair of complete ruptures of either tendon has been shown to provide good and predictable outcomes.¹⁻⁴ Nonoperative management is best suited for patients with partial injuries and minimal functional loss who experience resolution of both pain and weakness with appropriate rest and rehabilitation.

Nonoperative management is most likely to be considered only in the nondominant arms of self-employed tradespersons for whom the economic impact of the recovery from surgery would be a hardship.

BICEPS TENDON RUPTURES

The reported incidence of distal biceps tendon ruptures is 1.2 per 100,000 people, making it a rare injury. Accounting for 3% of all biceps tendon injuries, ruptures of the distal biceps tendon affect the dominant arm in 86% of individuals.⁵ This injury occurs almost entirely in men, although there have been reported cases in female athletes. An average age of 50 years has been cited in the literature, with a reported age range of 19 to 72 years. Common risk factors other than male gender include smoking, anabolic steroid use, and body building.⁵⁻⁷ Distal biceps tendon ruptures are seldom encountered in overhead athletes and

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are most common in weight lifters and body builders.

Ruptures of the distal biceps tendon are classified as complete or partial. Complete ruptures are further classified as acute or chronic, with the distinction drawn at 4 weeks; partial ruptures are not further classified. Descriptively, the anatomic location of the rupture is classified as tendinous/insertional, musculotendinous junction, and intramuscular. The anatomic location as well as the distinctions between partial and complete rupture and acute versus chronic injuries play important roles in management. Intratendinous ruptures and insertional avulsion are amenable to surgical repair, and should be surgically repaired, whereas intramuscular rupture is typically not repairable. Partial tears may be amenable to nonoperative management, whereas complete tears require repair if anatomically conducive. Chronic injuries may require reconstruction with tendon grafts.⁸

In athletes, this injury can occur during strength training or competition. In this population, the injury most commonly presents after a single traumatic event; however, there is evidence that predisposition to injury may be the result of both hypovascularity at the tendon insertion and possible mechanical impingement during forearm rotation. The mechanism of distal biceps tendon rupture is that of forced extension of the elbow held in 90° flexion while the forearm is supinated, a position commonly encountered in both weight training and athletic competition.

Presentation and Examination

Classically, patients describe a painful audible or palpable pop in their elbow during an activity involving the mechanism described earlier. Occasionally a prodromal ache localized to the antecubital fossa is described by the patient. There is often immediate onset of ecchymosis and swelling in the antecubital region. In addition, patients may complain of asymmetry of their arms, a palpable mass or lump, or pain and weakness with elbow flexion and/or supination.

Physical examination findings often confirm the presenting complaints with antecubital and medial elbow swelling and ecchymosis, a palpable mass in the proximal arm, or the so-called Popeye deformity. The absence of a palpable biceps tendon at the elbow crease is also often appreciated. An intact lacertus fibrosis may confound physical examination findings by confining the hematoma or restraining proximal migration of the ruptured tendon, leading to the absence of both ecchymosis and significant deformity on physical examination. Further findings of objective weakness

with elbow flexion and supination can be combined with provocative maneuvers to verify the clinical diagnosis of distal biceps tendon rupture. Complete distal biceps tendon rupture can be further confirmed on physical examination with the hook test, which in some studies has been shown to be both 100% sensitive and specific.⁹ The hook test is performed with the patient's elbow held in 90° of flexion with the forearm supinated. The examiner then attempts to hook the distal biceps tendon by pushing a flexed finger across the antecubital region from lateral to medial, thereby hooking an intact tendon (Fig. 1). Lack of resistance or absence of a palpable tendinous cord is considered a positive test. If the test is done in reverse; that is from medial to lateral, the examiner may be misled by the presence of an intact lacertus fibrosis. Pain with hook test can be a sign of partial tear.

Imaging

Despite the seemingly straightforward clinical diagnosis of distal biceps tendon rupture, the use of imaging is often indicated and beneficial. Devereaux and ElMaraghy¹⁰ found that, in patients with surgically confirmed complete tendon rupture, as few as 33% described an audible or palpable pop, and only 38% had visible deformity on examination preoperatively. The evaluation of a



Fig. 1. Hook test showing an intact distal biceps tendon.

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