

# Ultrasonic Percutaneous Tenotomy for Recalcitrant Calcific Triceps Tendinosis in a Competitive Strongman: A Case Report

Mederic M. Hall, MD<sup>1</sup> and Lisa Woodroffe, MD<sup>2</sup>

## Introduction

The sport of strongman has seen increasing popularity and participation in recent years. While there are similarities to other weight training, sports such as bodybuilding and powerlifting, there are unique aspects of strongman training and competition, which may influence injury risk (16). Strongman athletes are required to move near maximal loads, often of unusual size or shape, and are scored by time, number of repetitions completed, or maximal weight lifted. Strongman-specific events include heavy stone lifts, farmer's walk, log press, and circus dumbbell press (15). Strongman competitors appear to experience a relatively high injury rate compared with other weight training sport athletes (6).

The incidence of triceps tendon disorders in the strongman is unknown. A retrospective epidemiological study of strongman injuries reported 3.5% of total injuries involved tendon tears or strains of the elbow, although specific tendon was not reported (15). A recent systematic review of injuries among weightlifters and powerlifters reported elbow injuries accounted for 6% to 35% of injuries and tendon injuries comprised 12% to 25% of injuries (1). The incidence of triceps tendon disorders in the general population also is poorly understood. While thought to be rare, a retrospective review of more than 800 consecutive elbow magnetic resonance imaging (MRI) demonstrated a prevalence of triceps partial or complete tendon tear at nearly 4% (8). The incidence of chronic triceps tendinosis might be expected to be much higher as many of these injuries would not be routinely sent for advanced imaging.

The natural history of chronic triceps tendinosis is unknown. There are currently no treatments supported by high-

quality evidence. While it can be expected that most cases will resolve with conservative care, some cases are recalcitrant and pain and functional limitation may prevent the competitive athlete from return to sport. We present a challenging case of chronic calcific triceps tendinosis in a strongman competitor who failed traditional conservative measures and was unable to return to training/competition. Treatment with ultrasonic percutaneous tenotomy allowed for rapid pain improvement and return to full strongman competition at previous level of performance. This case represents the first report of this novel technique to successfully treat triceps tendinosis with full return to prior level of competition and sustained benefit greater than 3 yr postprocedure.

## Case Presentation

A 39-yr-old white male competitive strongman presented to our sports medicine clinic with chronic right posterior elbow pain. One and a half years prior, he had sustained an acute injury causing sharp pain near the olecranon while performing an overhead push press. Despite a period of rest and activity modification, he continued to have functionally limiting pain. He was seen by multiple health care providers over the ensuing months and received a number of treatments for presumed triceps tendinosis including exercise-based and manual physical therapy, chiropractic manipulations, and a corticosteroid injection. None of these treatments provided lasting benefit, and at time of presentation, the patient had discontinued competition, significantly limited training, and reported pain with many activities of daily living.

On examination, the right elbow demonstrated full and symmetric range of motion. There was no catching, clicking, or snapping in the elbow and no medial, lateral, or anterior tenderness. Tinel sign was negative at the ulnar nerve. There was no evidence of posterior elbow impingement, but tenderness was noted over the triceps insertion on the olecranon with resisted elbow extension. Strength of the elbow was normal to manual muscle testing but was asymmetric to heavy loads of resisted elbow extension secondary to pain. His neurovascular examination was normal.

Differential diagnosis included chronic triceps tendinosis, stress fracture of the olecranon, posterior elbow impingement, and olecranon bursitis. Outside radiographs demonstrated

<sup>1</sup>Department of Orthopedics and Rehabilitation, Department of Radiology, Department of Family Medicine, University of Iowa Sports Medicine, Iowa City, IA; and <sup>2</sup>Department of Pediatrics, University of Iowa Children's Hospital, Iowa City, IA

Address for correspondence: Mederic M. Hall, MD, UI Sports Medicine, 2701 Prairie Meadow Drive, Iowa City, IA 52242.  
E-mail: mederic-hall@uiowa.edu.

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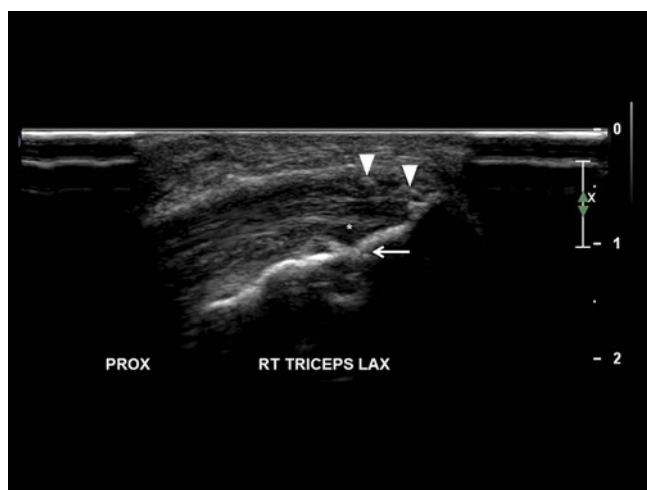
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an enthesophyte and calcifications in the region of the distal triceps tendon. Diagnostic ultrasound confirmed triceps tendinosis with intratendinous calcifications, cortical irregularity of the olecranon, and focal regions of hypoechogenicity consistent with chronic tendinosis (Fig. 1). A small focal intrasubstance partial thickness tear was appreciated (Fig. 2).

Treatment options were discussed with the patient including ongoing conservative management, platelet-rich plasma (PRP) injection, ultrasonic percutaneous tenotomy/tendon debridement, or open surgical debridement. Given the presence of intratendinous calcification, debridement was felt superior to PRP injection, and the patient elected to proceed with sonographically guided right triceps tendon ultrasonic percutaneous tenotomy. This was completed in an outpatient clinical procedure suite under sterile conditions and with local anesthesia. The TX 1 (Tenex Health, Lake Forest, CA) ultrasonic cutting device was advanced into the region of tendinosis via live sonographic guidance and the area was cut and debrided. The two regions of focal calcifications were debrided, and the osseous irregularities in association with these regions of tendinosis were abraded (Fig. 3). Total energy time was 3 min and 20 s. After the procedure, Steri-Strips were placed, followed by Tegaderm, and a compressive sleeve was applied.

Postprocedure rehabilitation consisted of 2 wk of rest using a sling as needed for comfort and pain-free active range of motion was started on postprocedure day 1. Patient reported no significant postprocedure pain and required no pain medication. He reported early improvement in ADL-related pain within the first 2 wk. He was allowed to begin progressive strengthening under the guidance of physical therapy at 2 wk, but instructed to avoid any activities that reproduced pain, and upper extremity pushing exercises were kept at very low weights and speed. At 6 wk follow-up, patient appreciated pain only at end-range resisted extension and with deep palpation. He was allowed to continue his strength progression including integration of sport specific skills



**Figure 1:** Long axis sonographic image of the right triceps tendon insertion. Note the cortical irregularity (*arrow*) and adjacent hypoechoic region (*asterisks*) representing small intrasubstance partial thickness tear. Intratendinous calcifications also are present (*arrowheads*). Left side of image is proximal.



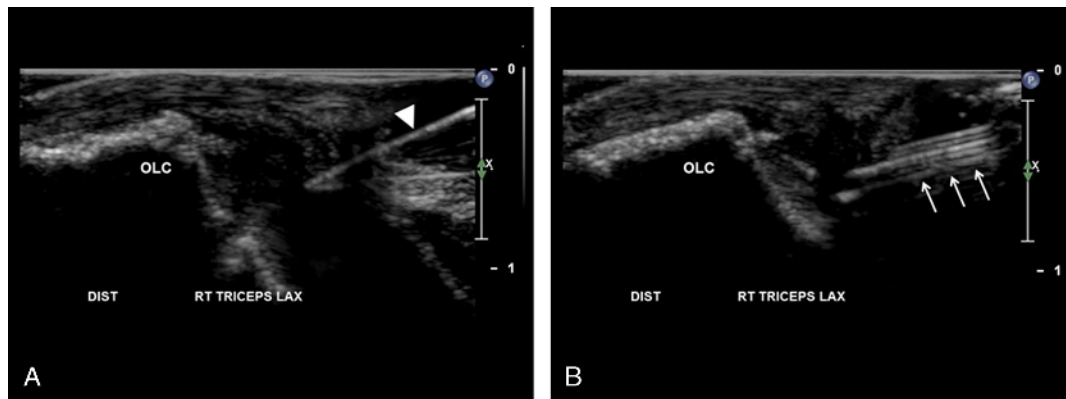
**Figure 2:** Long axis extended field of view sonographic image of the right triceps tendon insertion. Note the extent of the longitudinal tear (*between arrows*) extending from the region of cortical irregularity. Left side of image is proximal.

(although any ballistic extension based activities were withheld until after 12 wk). At 12-wk follow-up, patient demonstrated full pain-free range of motion (ROM) and strength, no pain to palpation, and was able to bench press 300 pounds and overhead press 200 pounds without pain. He was allowed to progress back to all sport specific activities at that time. He returned to full competition at 1 yr postprocedure and 3 yr postprocedure won the national championship at his division and remains completely pain free.

## Discussion

The triceps brachii muscle is the prime extensor of the elbow and its distal tendon is a bilaminated structure that inserts on the proximal olecranon (5,14). Injury to the distal triceps tendon is rare, and most of the available literature discusses traumatic complete ruptures with subsequent surgical management (3). Partial ruptures may be secondary to acute trauma or the progression of tendinosis with or without an acute event. Triceps tendinosis is an enthesopathy, and the pathophysiology is thought to be similar to other upper extremity enthesopathies, including myxoid degeneration with or without calcification and angiofibroblastic neoplasia, which may progress to collagen fibril rupture with subsequent acute injury as in our case presentation (12).

The clinical presentation of triceps tendinosis is typically straightforward. There is pain at the distal tendon/olecranon that worsens with resisted elbow extension. There may be mild local swelling, but not to the extent expected for olecranon bursitis. Bony tenderness at the enthesis is common, making olecranon stress injury difficult to distinguish on clinical examination. Range of motion should be full, and weakness is variable, but should only be mild secondary to pain inhibition in the setting of tendinosis or even small partial tears. Radiographs can be helpful in evaluating for other bony sources of pain and may demonstrate enthesophytes. Advanced imaging options include ultrasound and MRI. Ultrasound provides high-resolution imaging of the tendon and can accurately distinguish between complete and partial



**Figure 3:** A companion case of triceps tendinosis treated with ultrasonic percutaneous tenotomy. (A) After obtaining local anesthesia, a no. 11 blade (arrowhead) is used to create a tract down to the tendon. (B) The TX1 device (arrows) is then directed to the pathologic regions within the tendon and ultrasonic debridement performed. DIST, distal; OLC, olecranon.

tendon tears (4,13). MRI may be helpful when evaluating for other causes of pain, particularly within the elbow joint (3).

The natural history and optimal treatment of partial tears and tendinosis of the triceps tendon remain unknown and debated in the literature. One complicating factor is the definition of “partial tear” which is ill-defined (12). Some will use partial tear to refer to higher-grade tendinosis, whereas in other contexts, this truly represents partial avulsion of the tendon in a post-traumatic setting. Early surgical repair is recommended for tears involving 90% to 100% of the tendon, whereas tears involving up to 75% of the tendon have been treated successfully with nonoperative treatment in professional football athletes (9). It appears reasonable to recommend a trial of conservative nonoperative treatment for all cases of tendinosis and partial tears up to 50%.

Nonoperative treatment recommendations are likewise debated. There is currently no high-quality evidence to support any treatment of chronic triceps tendinosis (3,12). Given this lack of evidence, treatment recommendations tend to follow the general principles for treating tendinopathy. This includes a period of relative rest and activity modification, correction of training errors, and physical therapy to address any strength or mobility deficits and consideration of a trial of eccentric strengthening with or without the addition of nitric oxide patches. Although commonly prescribed, nonsteroidal anti-inflammatory drugs (NSAIDs) have not shown any long-term benefit (2). Corticosteroid injections are contraindicated and have been associated with rupture of the distal triceps tendon (14).

When conservative treatment fails, there is often hesitancy to move forward with surgical management given the lack of evidence and more aggressive nature of traditional operative treatment. Surgical excision similar to that used for common extensor tendinosis has been described, although no specific case series of the technique have been published (10). More recently, ultrasonic percutaneous tenotomy has become a less-invasive option for treatment of chronic recalcitrant tendinopathy with excellent results reported up to 3 yr follow-up (7,11). In this case, a similar technique was used which allowed for complete resolution of pain and return to prior level of competition in a sport which places maximal demand on the triceps tendon.

## Conclusions

Chronic triceps tendinosis can be debilitating and career threatening for the competitive strength athlete. When conservative treatment fails, ultrasonic percutaneous tenotomy may be a safe and effective treatment option allowing for full return to sport.

M.M.H. is a consultant in Tenex Health and medical advisor board in Sonex Health.

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