CASE REPORT PEER REVIEWED | OPEN ACCESS

Distal biceps tendon rupture in a 22-year-old female collegiate softball player

Michael D. Oberle, Ryan C. Butler, Bart Eastwood

ABSTRACT

Introduction: Distal biceps brachii tendon ruptures are an injury most commonly observed in the middle aged men following an extreme eccentric load. Case Report: A 22-year-old female collegiate softball pitcher ruptured her distal biceps brachii tendon while competing. After several weeks of conservative treatment the patient elected for surgical repair. The surgery was performed with a single incision approach and the tension-slide method. The athlete responded well to the surgery and at 20 weeks postoperative was performing light throwing in preparation for the upcoming season. Conclusion: With the increasing popularity of softball, it is impossible to predict whether this case represents an isolated incident or an injury that was misdiagnosed in the past. This injury in a patient of this gender and age was absent in the sports medicine and orthopedic literature until this case. The current literature contains only cases of full ruptures in females over 40 years of age. This injury is the first of its kind in a collegiate softball player. It is possible with the recent increased popularity of softball and looser pitching rules that this injury may begin to occur with increased frequency.

Keywords: Athletes, Elbow, Sports, Supination

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Michael D. Oberle[1], Ryan C. Butler[2], Bart Eastwood[3]

Affiliations: [1]Medical Student, Edward via College of Osteopathic Medicine-Auburn Campus, Auburn, Alabama, USA; [2]Certified Athletic Trainer, Athletics, University of Dayton, Dayton, Ohio, USA; [3]Orthopedic Surgeon, Sideline Orthopedics and Sports Medicine, Blacksburg, Virginia, USA.

Corresponding Author: Michael Dean Oberle, 910 South Donahue Drive, Auburn, United States of America, 36832; Email: moberle@auburn.vcom.edu

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INTRODUCTION

Distal biceps brachii tendon ruptures are uncommon injuries, representing 3–10% of biceps tendon tears [1, 2]. The classic clinical presentation is a middle aged male with history of excessive eccentric contraction. These patients commonly have a history of weightlifting or bodybuilding. Safran et al. reported an overall incidence of 1.2/100,000, increasing with anabolic steroid and tobacco usage [3]. Recently, researchers utilized Pearl Diver Technologies' (Colorado Springs, CO, USA) national database containing public and private insurance patients to estimate the incidence at 2.55/100,000 and noted the development of the hook test could be the primary reason for the rise in incidence [4].

Researchers describe a remarkably slim number of female cases in the literature, the majority of which are in elderly women with a more insidious clinical course than found in males [2]. To date, orthopedic literature contains only six reports of complete tendon ruptures in

females [2, 3, 5–7]. An examination of literature indicates the youngest female to ever suffer a complete distal biceps tendon rupture was 43-year-old [5]. Non-surgical management of the injury is an option, with a documented decrease in elbow flexion range of motion and supination strength [8]. The current recommendation for young, active patients is surgical repair within 2–3 weeks of the injury, utilizing the technique the surgeon is most comfortable with [9].

CASE REPORT

A 22-year-old right hand dominant female Division II college softball pitcher presented to the team athletic trainer with sharp pain in her forearm following an inning of pitching. Before the injury the athlete had thrown a total of 13 innings and approximately 200 pitches in two previous games. The athlete was a senior in college with three years and 300 innings of National Collegiate Athletic Association (NCAA) pitching experience with no documented injuries. After completing the 2nd inning the athlete notified the athletic trainer that she had a sharp pain just distal to her elbow. She reported that with every pitch she felt a snap/pop in her right elbow region.

The player was removed from the game and the athletic training staff performed a full examination. The athlete reported a pain of 9/10 localizing to the antecubital fossa with radiation to the anterior forearm. A 20 degree loss of elbow extension with notable strength deficiency was appreciated on examination. Elbow extension was pain free until the last 20 degrees of motion. The athlete also expressed pain with elbow flexion, supination, and pronation. The distal bicep was still visible and palpably present in the fossa. The only visual abnormality was minor swelling in the antecubital fossa.

The initial differential included strains of either bicep tendon, flexor pronator teres or ulnar collateral ligament. The athlete was placed in a sling for comfort and advised to ice the injury. When the athlete was reassessed in the morning, the fossa did not present any additional swelling or development of ecchymosis. The athlete was sent for X-rays which returned negative for bony abnormalities. In the next 48 hours, the athlete managed to regain 10 degrees of elbow flexion but no reduction in pain.

The athlete was evaluated by the orthopedic surgeon team four days following the injury. Based on a thorough history and physical examination the surgeon elected to order an MRI scan to aid in diagnosis. The MRI scan revealed a near full-thickness tear of the distal biceps tendon. The tear was estimated to be nearly 90%. After the patient was dissatisfied with the results of conservative treatment the physician elected for surgical repair. The surgery was performed one month after the injury. In the pre-operative period, the athlete was in the athletic training room working on simple range of motion exercises to prepare herself for surgery.

Surgery was performed 31 days post-injury. Examination under anesthesia revealed a near full thickness tear of the distal biceps tendon. Signs of retraction or migration were not observed. This permitted the incision to remain distal to the antecubital fossa. The only other abnormality noted was a small seroma. The procedure was performed using a single incision approach. The surgeon conducted the repair with a BicepsButton™ (Arthrex Inc., Naples, FL, USA) and the Tension-Slide technique as described by the manufacturer [10, 11]. Proper placement was confirmed by X-ray and the site was closed. The patient was placed in sterile dressing and a posterior splint.

The athlete was seen the next day for examination of the incision site. The athlete began rehabilitation a week post-surgery with the athletic trainer. Her first rehabilitation session included: Passive elbow flexion and extension, active supination and pronation, and active ball squeezes. The athlete was seen by the surgeon ten days following the operation. The athlete's greatest complaint during the first month of rehabilitation was wrist pain stemming from immobilization. After four weeks of rehabilitation she was permitted to discontinue use of her brace. Based on the surgeon's rehabilitation protocol, the athlete was two weeks ahead of schedule at one month post-surgery. The athlete was seen once again 20 weeks after the operation. The athlete had begun light throwing exercises in preparation for her second chance at a senior softball season.

DISCUSSION

Complete rupture of the distal biceps tendon is an exceptionally rare injury in females and this is the youngest reported female in literature to experience the injury and the seventh female overall. In recent years, the popularity of softball, and all women's athletics, has increased. The significantly looser pitching rules that exist in softball, compared with baseball, result in the potential for more of these injuries to occur [12]. Overuse shoulder injuries are one of the most prevalent injuries in NCAA softball [13]. The sports medicine staff must always be cognizant of potential elbow pathology, including distal biceps tendon ruptures. In order to make the diagnosis, a physician must maintain a high index of suspicion. In the event of a diagnosis being unclear magnetic resonance imagining has been proven effective to confirm complete or partial bicep tendon tears [14, 15].

Multiple reports of distal biceps tendon tears have manifested as a cystic mass in the antecubital fossa [2, 14, 16–19]. This physical examination finding has the potential to be of diagnostic relevance and there exists a need to evaluate its clinical usefulness. Several patients were referred for either tumor workup or evaluated for a suspected neoplasm [2, 16]. It is important in these masses to first rule out malignancy and then evaluate for a distal biceps tendon tear.

Surgical reattachment to the radial tuberosity, as in this case, is considered the standard of care for young active patients [9]. Specific recommendations for young females do not exist, as this was the first case of its kind. Multiple theories exist for the etiology of distal biceps tendon ruptures and the gender disparity observed. Relative risk factors include a degenerative process, impingement, recent fluoroquinolone usage and a hypovascular zone of the tendon [20, 21]. The leading theory for the observed gender inequality is the increased muscle cross-sectional area which is capable of generating a greater force on the tendon [6]. Incongruences are observed in other tendon ruptures, namely Achilles, quadriceps, and patellar tendons [2].

CONCLUSION

This report featured the presentation, treatment and outcome of the youngest female patient in literature to suffer from a complete distal biceps tendon rupture. With the increasing popularity of softball, it is impossible to predict whether this represents an isolated incident or an injury which was misdiagnosed in the past. It is hopeful that the patient will experience the excellent results which are common-place among males of similar age undergoing the same surgery and rehabilitation.

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Michael D. Oberle — Acquisition of data, Drafting the article, Revising it critically for important intellectual content, Final approval of the version to be published
Ryan C. Butler — Analysis and interpretation of data, Drafting the article and Critical revision of the article, Final approval of the version to be published
Bart Eastwood — Substantial contributions to conception and design, Revising it critically for important intellectual content, Final approval of the version to be published

Guarantor
The corresponding author is the guarantor of submission.

Conflict of Interest
Authors declare no conflict of interest.

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