Distal Biceps Brachii Tendon Rupture

Cristy Eggers ATS, Jason C. Craddock EdD ATC, LAT CSCS

Florida Gulf Coast University, Department of Rehabilitation Sciences, Fort Myers, FL USA

Abstract

Background: A thirty five year old male presented for rehabilitation one-week post surgical repair of the distal biceps brachii tendon. The patient reported hearing a pop while undergoing a concentric contraction of the biceps brachii during a lifting maneuver at the time of injury. Physician records indicate a successful repair of a grade 2 rupture. Grade 2 injuries involve the avulsion of both the long and short head insertions of the tendon. However, with this injury the lacertus fibrosus remains intact and muscle retraction proximally is minimal. Weakness during resisted supination and flexion at the elbow is a prominent clinical presentation in addition to a positive hook test. The initial rehabilitation evaluation revealed decreased range of motion, muscular weakness and strength deficits of the elbow and hand, and a decrease in proprioception of the entire upper extremity. **Differential Diagnosis:** N/A **Treatment:** All rehab protocols utilized the progressive plan outlined by the Gunderson Health System. The first four weeks within the therapy time frame consisted of the patient's arm being immobilized with an adjusted brace. Clinician assisted passive range of motion enabled the patient to achieve full range of motion sooner than anticipated by the Gunderson protocol. At approximately 6 weeks post surgery, upper extremity stabilization exercises were initiated to focus on maintaining strength of the shoulder in all planes of motion. Prone rows, horizontal abduction and the Rockwood 5 were soon followed by triceps extension and wrist flexion and extension. The 8-week post surgical mark began the initiation of more intensive shoulder exercise, active elbow flexion and extension, and active forearm supination and pronation. A slow progression towards light resistance was implemented just prior to the patient's release just after 12 weeks of therapy. **Uniqueness:** The research available to date reveals that approximately 3% of biceps brachii ruptures are located at the distal tendon insertion, while a staggering 96% occurs at the proximal origin of the long head tendon. This type of injury generally occurs in males in the bracket of 40-60 years of age, although women and all age groups may experience a rupture, as well. Due to the low incidence rate of this injury, this case provides valuable insight into the patient's ability to regain full range of motion and return to their pre-injury activity level. **Conclusion:** The increase in activity amongst the population leads to ramifications of increased incidence of injuries such as distal biceps brachii tendon ruptures. Research on the subject is limited to retrospective studies, case studies, and experimental studies with cadavers. The patient gained full ROM and use of his injured arm at the time of his release from care. The patient stated that activities of daily living were achieved with no issues, and that his ability to lift light objects was limited only by his fear of re-injury. The limitation of this study is the inability to test the patient at the 6-month and 1-year mark to determine the extent of his strength gains in the affected arm.

Introduction

Distal biceps brachii ruptures, though once considered to be rare, are becoming a more common occurrence due to increasingly active lifestyles. The research available to date reveals that approximately 3% of biceps brachii ruptures are located at the distal tendon insertion, while a staggering 96% occurs at the proximal origin of the long head. The following information will explain the mechanism of injury, clinical assessments, surgical interventions, treatments and functional outcome for this unique injury.

Purpose

The purpose of this case report was to introduce a 35 year-old male with no prior medical history who presented with a grade II distal biceps tendon rupture. The patient reported hearing a pop while undergoing a concentric contraction of the biceps brachii during a lifting maneuver. Due to the low incidence rate of this injury, this case provides valuable insight into the patient's ability to regain full range of motion and return to their pre-injury activity level.

Anatomy

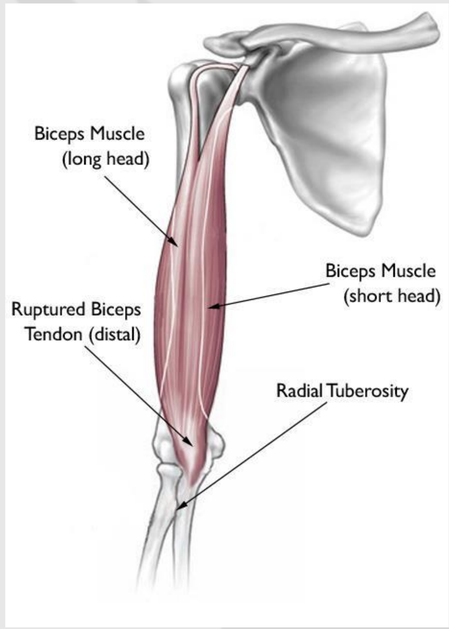
The flexor compartment of the arm is responsible for flexion at the elbow, with the biceps brachii assuming much of the responsibility. The biceps brachii consists of two heads, the long and short head. Proximally, each head of the biceps brachii originates at different locations. Distally, however, this muscle converges at the musculotendinous junction. Here the tendons are surrounded by the lacertus fibrosis, a 3-layer aponeurosis that aids in the stabilization of the distal tendons. Although the long and short heads of the biceps brachii appear to have one insertion at the radius, the long head actually inserts onto the prominence of the radial tuberosity while the short head inserts just distally on the shaft of the radius. Situated radial to the biceps tendon, the bicipitoradial bursa is positioned between the tendon and the radial tuberosity, and serves to reduce friction that occurs when the muscle contracts (Higgins, 2011).

Case Report

Patient: A 35 year old male with no prior medical history presented for rehabilitation post-surgically following a repair of a Grade II distal biceps brachii tendon rupture. The following information will explain the mechanism of injury, clinical assessments, treatments and functional outcome for this unique injury.

Mechanism of Injury: The fact that the biceps brachii muscle spans two joints, the elbow and shoulder, increases risk of muscle damage when it is placed in unfavorable eccentric loading condition. Acute injuries occur most often during an eccentric muscle contraction such as lifting or lowering a heavy object (Blackmore, Jander & Culp, 2006). When this occurs, all or part of the tendon disassociates at the radial tuberosity insertion. Potential theories of factors that may contribute to this type of rupture include mechanical abrasion from a hypertrophied radial tuberosity, intra-tendinous degeneration, decreased vascularity, and previous anabolic steroid use. The patient reported hearing a pop during a lifting maneuver while undergoing a concentric muscle contraction.

Clinical Examination: The clinical presentation of a distal biceps brachii rupture is heavily dependent upon the grade of rupture. Complete ruptures, such as those occurring with a grade 3 or 4 injuries, generally present with a palpable defect of the muscle belly and ecchymosis of the medial aspect of the elbow (Bain & Durrant, 2010). Patients will often complain of pseudoparalysis, or the inability to flex the arm, immediately following the injury. However, a grade 2 rupture may lack the formation of ecchymosis due to the lacertus fibrosis remaining intact. The initial rehabilitation evaluation revealed decreased range of motion, muscular weakness and strength deficits of the elbow and hand, and a decrease in proprioception of the entire upper extremity.

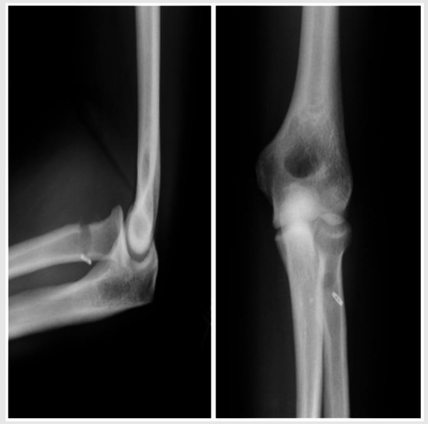


Rehabilitation and Results

Records indicate a successful repair of a grade 2 rupture. The initial rehabilitation evaluation revealed decreased range of motion, muscular weakness and strength deficits of the elbow and hand, and a decrease in proprioception of the entire upper extremity. All rehab protocols utilized the progressive plan outlined by the Gunderson Health System.

The first four weeks within the therapy time frame consisted of the patient's arm being immobilized with an adjusted brace. Clinician assisted passive range of motion enabled the patient to achieve full range of motion sooner than anticipated by the Gunderson protocol. At approximately 6 weeks post surgery, upper extremity stabilization exercises were initiated to focus on maintaining strength of the shoulder in all planes of motion. Prone rows, horizontal abduction and the Rockwood 5 were soon followed by triceps extension and wrist flexion and extension. The 8-week post surgical mark began the initiation of more intensive shoulder exercise, active elbow flexion and extension, and active forearm supination and pronation. A slow progression towards light resistance was implemented just prior to the patient's release just after 12 weeks of therapy.

The patient gained full ROM and use of his injured arm at the time of his release from care. The patient stated that activities of daily living were achieved with no issues, and that his ability to lift light objects was limited only by his fear of re-injury. The limitations of this study is the inability to test the patient at the 6-month and 1-year mark to determine the extent of his strength gains in the affected arm.



Discussion and Summary

The increase in activity amongst the population leads to ramifications of increased incidence of injuries such as distal biceps brachii tendon ruptures. Research on the subject is limited to retrospective studies, case studies, and experimental studies with cadavers. As surgical technology improves, so too does the prognosis and outcome of patients who are inflicted with these type of injuries. Prevention, injury management and rehabilitation protocols are limited only by the number of cases that are present and existing literature.

Overall, the final prognosis and patient satisfaction with outcomes are very positive. Currently, there are no specific functional tests that are applied to cases of distal biceps brachii tendon ruptures other than activities of daily living, ROM, and muscle testing. While most patients retained the ability to perform pre-injury work and activity related function, most of the literature available is based on case studies. Rehabilitation protocols utilized Virk et al. (2014) average 3-6 months duration, with active patients being allowed to return to sport within this time. The fact the patient-reported outcome measures such as Oxford, MEPS and DASH reveal an average of 95% good-excellent results post surgery is a promising indicator that evolving surgical techniques for ruptures of the tendon are capable of returning patients to their pre-injury activity level (Sarda et al., 2013).

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