

Acute Compartment Syndrome Following Distal Biceps Tendon Rupture in an Otherwise Healthy Male

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Abstract

This case presents acute compartment syndrome of the anterior upper arm following a distal biceps tendon rupture in an otherwise healthy 33-year-old male. Biceps compartment syndrome following biceps tendon rupture has been rarely reported, and to our knowledge, only 2 other cases have been reported in the literature. In both of these previous cases, it was associated with anticoagulation therapy in elderly men. This is the only case reported of a biceps compartment syndrome in an otherwise healthy young male.

Biceps compartment syndrome following biceps tendon rupture has been rarely reported, and to our knowledge, only 2 cases have been reported in the literature. In these cases, biceps compartment syndrome was associated with anticoagulation therapy in elderly men.^{1,2} Anticoagulation therapy is an established risk factor for compartment syndrome, but even in treated patients, compartment syndrome following biceps tendon rupture is rare.¹⁻³ This case presents a previously unreported biceps compartment syndrome following a distal biceps tendon rupture in an otherwise healthy young male. The patient provided written informed consent for print and electronic publication of this case report.

Case Report

A 33-year-old right-hand dominant manual labor worker reported injuring his right arm while helping to move a washing machine. The patient stated that he heard a pop from his right arm at the time of injury. He initially went to an outside facility 2 days prior to presenting to the emergency department at our facility. Upon initial presentation at the outside facility, physical examination was performed for biceps pain, and the patient was diagnosed with a distal biceps tendon rupture. He was placed in a posterior splint at the time of diagnosis and

sent home; follow-up by an orthopedic physician was scheduled for a later date.

When presenting to us 2 days after the initial injury, he reported severe pain recalcitrant to maximum doses of narcotics, swelling in the right bicipital region that had increasingly progressed since the time of injury, and developed paresthesias in his forearm. The patient had removed his splint at home due to the continued swelling and pain, but both symptoms continued to progress. The patient reported no significant past medical or surgical history, and denied any use of medications.

Upon examination, significant ecchymosis was apparent in the right antecubital area and the biceps was swollen and hard upon palpation (**Figure 1**). Decreased sensation was present over the antecubital fossa and down the anterior medial aspect of the forearm, but was otherwise neurovascularly intact distally with equally strong pulses bilaterally. The patient also had pain out of proportion to the apparent injury on passive flexion and extension of the elbow. Motor function was intact, but restricted due to pain. Radiographs showed no dislocations or fractures. Compartment pressures were obtained in the right bicipital region using an intra-compartmental pressure monitor, and demonstrated 2 separate pressure readings of 43 and 58 mmHg.

Figure 1. Preoperative right arm with distal biceps tendon rupture and compartment syndrome.



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Figure 2. Right arm showing the incision for fasciotomy and extracted hematoma. The ruptured biceps tendon is also visible outside the distal aspect of the incision.

Diagnosis of compartment syndrome of the right bicep was made based on an increasing, greater than 30 mmHg, compartment pressure concurrent with severely worsening symptoms.⁴ The patient was taken to the operating room to undergo an emergency fasciotomy and exploration. Fasciotomy exposed a greater than 400 mL gelatinous hematoma (Figure 2), which was evacuated and followed by copious irrigation of the compartment. At the time of surgery, the muscles of the anterior compartment remained contractile to electrical stimulation along with normal color, consistence, and capacity to bleed. The distal biceps tendon was easily identified (Figure 2), and had clearly avulsed from the radial tuberosity with no proximal injury noted. The lateral antebrachial cutaneous nerve was also identified and found to be intact, but with the color and consistency of a prior ischemic event. The fascia was left open, a drain placed, the skin loosely closed, and a sterile dressing applied. Intraoperative bleeding was minimal with no abnormal bleeding characteristics. The patient was placed in a sling, administered intravenous antibiotic therapy, and admitted overnight. The following day he was discharged for close follow-up in the clinic.

A hematology work-up was performed for bleeding disorders; no signs were found. The patient did not report any history of bruising, excess bleeding, diagnoses of bleeding disorders, or family history of bleeding disorders. He also did not report any past use of anticoagulants.

The patient returned 20 days following the compartment release for a surgical repair of the ruptured distal biceps tendon. A standard 1-incision distal biceps tendon repair using 2 suture anchors was performed. No complications or abnormal bleeding occurred at the time of the surgery; the lateral antebrachial nerve was identified without any changes noted. The wound was copiously irrigated, a drain placed, and the wound closed. The patient started occupational therapy in the early postoperative period and regained 90% of his range of motion and 85% of his supination strength, while his forearm numbness remained unchanged.

Discussion

Rupture of the biceps tendons can occur distally or proximally at either the long or short heads. Long-head tendon ruptures account for 96% of all biceps tendon ruptures. Distal tendon ruptures are much less common (3%) and short-head tendon ruptures are rare (1%).⁵ Although it has been shown that biceps tendon rupture occurs predominantly in older men, it has been shown that the less common, distal tendon ruptures, as demonstrated in this case, most frequently occur in men during their fourth decade. Distal tendon ruptures typically occur during excessive eccentric tension as the arm is forced from a flexed position.⁶ Non-surgical treatment of distal biceps rupture has been shown to lead to a mean loss of 40% supination strength, and a variable loss of flexion strength averaging 30%. In contrast, immediate surgical repair frequently results in minimal loss of strength at one year after repair.⁷

Acute compartment syndromes can typically be diagnosed clinically, but in the case of a differential diagnosis, intra-compartmental pressures can be measured. Compartmental pressures with 30 mmHg or less pressure difference from the patient's diastolic pressure, or compartment pressures greater than 30 mmHg with worsening and severe symptoms indicates the need for emergency compartmental fasciotomy to prevent further tissue damage.⁴

In order to obtain a favorable outcome with decreased morbidity, a high index of suspicion must be maintained to allow for early diagnosis and surgical treatment. This case indicates the need for awareness of the possibility that a compartment syndrome can develop as a result of a biceps tendon rupture in an otherwise healthy patient.

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References

- Richards AM, Moss ALH. Biceps rupture in a patient on long term anticoagulation leading to compartment syndrome and nerve palsies. *J Hand Surg Br.* 1997;22(3):411-412.
- Fung DA, Frey S, Grossman RB. Rare case of upper arm compartment syndrome following biceps tendon rupture. *Orthopedics.* 2008;31(5):494.
- Griffiths D, Jones DH. Spontaneous compartment syndrome in a patient on long-term anticoagulation. *J Hand Surg Br.* 1993;18(1):41-42.
- Prasarn ML, Ouellette EA. Acute Compartment Syndrome of the Upper Extremity. *J Am Acad Orthop Surg.* 2011 January; 13(7):436-444.
- Gilcreest EL, Albi P. Unusual lesions of muscles and tendons of the shoulder girdle and upper arm. *Surg Gynecol Obstet.* 1939;68:903-917.
- Safran MR, Graham SM. Distal Biceps tendon ruptures: incidence demographics and the effect of smoking. *Clin Orthop.* 2002;(404):275-283.
- Morrey BF, Askew LJ, An KN, Dobyns JH. Rupture of the distal tendon of the biceps brachii: a biomechanical study. *J Bone Joint Surg Am.* 1985;67(3):418-421.