


# Brachial artery trauma as a complication of bicep muscle injury

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## ABSTRACT

We describe a rare case of injury to a branch of the brachial artery in a 48-year-old man with a bicep musculotendinous injury. His presenting symptoms included severe pain, swelling, and paresthesias in the right upper extremity. Examination revealed significant soft tissue swelling with ecchymoses in the right upper arm with diminished palpable pulses. Imaging revealed a biceps muscle injury along with active arterial extravasation of a branch of the deep brachial artery. Interventional radiology successfully performed coil embolization. Bicep musculotendinous injury is typically characterized by pain, swelling, and decreased strength. Rarely, complications such as compartment syndrome have been reported. Brachial arterial injury has not been implicated in the setting of this entity, especially in the absence of blunt or penetrating trauma, until our current patient's presentation.

**KEYWORDS** Bicep muscle injury; brachial artery injury; compartment syndrome; intramuscular hematoma; vascular complication

**B**icep muscle injuries typically occur as a result of significant eccentric loading when the muscle is contracted.<sup>1</sup> This entity is a spectrum of illness ranging from proximal tendon injury to muscular injury to the more common distal tendon injury.<sup>2</sup> Patients describe sudden pain during the exertional activity with the affected arm, occasionally associated with a snap or pop in the region of the injury. In some cases, migration of the biceps muscle belly causes an abnormal contour to the upper arm, sometimes referred to as Popeye sign.<sup>3</sup> Given the degree of swelling and ecchymoses that may be present at the time of the initial presentation, the clinician may have difficulty assessing the extent of the bicep injury.<sup>4</sup> Thorough neurovascular evaluation is imperative to rule out concomitant compartment syndrome or other nerve injury.<sup>5–7</sup> To the best of our knowledge, no prior cases of acute vascular injury have been reported as a complication of bicep muscle injury in the absence of blunt or penetrating trauma.<sup>8,9</sup> We present a novel case of bicep muscle injury with a rare complication of vascular injury requiring emergent intervention to prevent potential limb-threatening outcomes.

## CASE PRESENTATION

A 48-year-old man presented to the emergency department with complaints of swelling, pain, and limited range of motion of the right upper extremity (RUE). His symptoms began after feeling

a pop in his right arm while losing an arm-wrestling contest 48 hours earlier. He was evaluated 12 hours after the initial injury and diagnosed with a possible bicep tendon rupture. At that time, the patient was discharged with a sling, pain medications, and orthopedic follow-up. He experienced worsening RUE swelling, numbness, paresthesias, and uncontrolled pain, prompting a return visit to the emergency department. The patient endorsed a history of untreated hypertension and testosterone use but denied any surgeries. His exam was significant for swelling and tenderness extending from the right anterior chest near the pectoralis major muscle distally to the antecubital fossa and forearm. Diffuse ecchymoses was present in the medial upper arm. He reported significant pain with active or passive range of motion testing of the RUE, thus limiting strength examination. The right radial pulse was difficult to palpate given the degree of swelling, but bedside Doppler ultrasound confirmed the presence of good pulse waveform. Laboratory evaluation was notable for a creatinine of 1.36 mg/dL and a creatine kinase of 520 U/L. Orthopedic surgery was consulted given concerns for development of compartment syndrome.

Stryker Device compartment pressures were measured as 25, 17, 14, and 5 mm Hg in the proximal biceps, distal biceps, deltoid, and pectoralis major, respectively. Computed tomography (CT) angiogram of the RUE revealed active arterial extravasation within the biceps with marked swelling related to muscular injury and intramuscular hematoma formation (*Figure 1*). Interventional

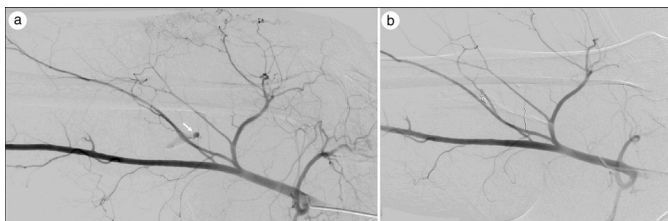
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**Figure 1.** Axial and sagittal maximum intensity projection images from CT angiogram of the right upper extremity. **(a)** Precontrast axial image at the level of the upper humerus demonstrates an expanded, heterogeneous proximal right biceps muscle with a large intramuscular hematoma (asterisk). **(b)** Active arterial extravasation is present within the biceps musculature at the level of the proximal humerus (arrow), with **(c)** pooling on venous phase (arrow).



**Figure 2.** **(a)** Conventional angiogram of the right upper extremity demonstrates active extravasation (arrow) from two branches of the deep brachial artery. **(b)** Both vessels were treated with coil embolization, with resolution of hemorrhage on postembolization angiogram.

radiology performed angiography, showing extravasation from two branches of the distal deep brachial artery, which were successfully embolized with coils (*Figure 2*). The patient was admitted for continued monitoring of compartment pressures and pain control. The presumed mechanism of injury was a bicep muscle tear and intramuscular hematoma with deep brachial artery rupture during an extension and external rotation mechanism, as could be observed in the loss of an arm-wrestling contest. The patient improved during his 3-day hospitalization with decreased swelling, good distal perfusion, and improved RUE motor function. In the outpatient setting, he recovered with occupational therapy and returned to work approximately 1 month after his initial injury.

## DISCUSSION

We describe a patient with traumatic injury to a branch of the deep brachial artery secondary to a biceps muscle tear sustained during arm wrestling. The brachial artery is the most commonly injured artery in the upper extremity, accounting for 28% of all vascular injuries.<sup>10</sup> Vascular injury frequently occurs secondary to penetrating or blunt trauma but has not been associated directly with bicep musculotendinous injury, as seen in our case. Patients with brachial artery injury may present with signs and symptoms of arterial ischemia, including pulse deficit, hemorrhage, hematoma, venous injury, or peripheral nerve injury.<sup>9</sup> The patient described in this case experienced pulse inadequacy, a relatively uncommon finding in brachial artery injuries, defined as a decreased pulse by palpation but present on Doppler ultrasound.<sup>11</sup> Brachial artery injuries can be diagnosed with duplex ultrasonography alone, but if the diagnosis remains uncertain it can be confirmed with angiography.

Lateral repair, end-to-end anastomosis, and venous grafting have been described as the most common surgical procedures

for treatment of brachial artery injuries.<sup>9</sup> However, in this case, arterial embolization was utilized, as only two branches of the distal deep brachial artery were affected. Complications of brachial artery injury and repair include nerve injury, edema, thrombosis, and rarely compartment syndrome.<sup>9</sup>

The prevalence of bicep tendon rupture is reported as 1.2 per 100,000 patients/year<sup>12</sup> to more recent estimates of 2.55 per 100,000 patients/year.<sup>13</sup> Men with a mean age of 46 make up the vast majority (95%) of these patients.<sup>13</sup> Injuries associated with arm wrestling occur almost exclusively in men and include spiral or medial epicondyle fractures of the humerus.<sup>14</sup> In a literature review by Moloney et al, only one case described a bicep tendon injury secondary to arm wrestling, and there were no mentions of brachial artery injury, as seen in our patient.<sup>14</sup> This case presentation serves as an impressive example of a severe complication from bicep muscle injury in a patient presenting with potential limb-threatening complaints.

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