Distal Biceps Rupture: The Coil Sign

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abstract

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Delayed repair of the distal biceps brachii tendon can lead to the formation of scar tissue and coiling of the tendon. Dissection of the scar tissue and unraveling of the tendon may allow for anatomic repair to the radial tuberosity. A 50-year-old man had a distal biceps brachii tendon tear with an intact lacertus fibrosis. Surgery was performed 22 days after injury. On inspection, the distal biceps tendon was coiled, encased in scar tissue, and unable to be reduced to the radial tuberosity. Dissection of the scar tissue and unraveling of the tendon provided additional length, allowing anatomic repair. Postoperatively, the patient regained full range of motion and strength and returned to work without restrictions. After a distal biceps brachii tear in which the lacertus fibrosis remains intact, the coiled tendon may become enveloped in a sheath of scar tissue. Dissection of the “pseudosheath” unveils the native tendon and allows reduction to the radial tuberosity. Cadaveric analysis shows that the pseudosheath may conceal 6 cm of coiled tendon. When the lacertus fibrosis remains intact after distal biceps tendon rupture, the tethered tendon stump may coil, become encased in scar tissue, and resemble the native tendon. Failure to identify the native tendon could result in the loss of 6 cm of tendon.
Early anatomic repair of distal biceps brachii tendon ruptures has proven efficacy in restoration of flexion, supination strength, and endurance.\(^1\)\(^-\)\(^7\) Outcomes after delayed repair are less predictable, have a higher complication rate, and often necessitate tendon allograft or nonanatomic repair.\(^3\)\(^,\)\(^6\)\(^,\)\(^8\) Ramsey\(^7\) described a classification system for distal biceps tendon ruptures that recognized the importance of the lacertus fibrosis. An intact lacertus fibrosis tethers the midportion of the distal biceps tendon and prevents it from retracting proximally, which may extend the time allowed for anatomic repair. Within the first few weeks after injury, the biceps tendon and lacertus fibrosis often become encased in scar tissue, making visualization of the tendon difficult. This article describes the case of a distal biceps tendon rupture with an intact lacertus fibrosis where the tendon was sheathed in scar tissue. Uncoiling of the tendon and excision of scar tissue allowed for anatomic repair.

**Case Report**

A 50-year-old, right-hand-dominant male electrician was lifting a ladder with his left arm when he felt a sudden sharp, painful tearing of the distal biceps. The patient had immediate swelling and deformity followed by ecchymosis of the anterior arm and anteromedial forearm. Physical examination showed tenderness over the antecubital fossa, an abnormal hook test result,\(^9\) moderate proximal retraction of the biceps brachii muscle, and weakness with flexion and supination.

A magnetic resonance imaging scan was obtained and showed complete disruption of the distal biceps brachii tendon with 6 cm of proximal retraction. The lacertus fibrosis remained intact, preventing further retraction of the tendon. Furthermore, the lacertus fibrosis acted as a tether, allowing the more distal portion to coil under the proximal portion (**Figure 1**). The patient underwent surgery 22 days after the injury. A modified 2-incision Boyd-Anderson technique was performed and showed complete rupture of the distal biceps and an intact lacertus fibrosis. The distal biceps tendon stump was identified and found to be covered in scar tissue. The distal biceps tendon stump was released from the lacertus fibrosis and the biceps muscle was lysed of all adhesions, allowing for maximal mobilization. The tendon stump could not be reduced to the radial tuberosity. Careful inspection of the stump showed exuberant scar tissue that did not resemble the typical morphologic features of tendon. Dissection of the scar tissue “pseudosheath” was performed and showed the native tendon buried within this envelope. The native tendon had coiled within the pseudosheath. Once released, it added length, allowing reduction of the tendon to the radial tuberosity. A whip stitch was then placed through the tendon and secured to the radial tuberosity via bone tunnels, as is customary with the modified Boyd-Anderson technique.\(^10\) The patient underwent a standard postoperative protocol and was placed in a posterior splint for 10 days. He then began passive and active-assisted range of motion exercises. Strengthening was started at 6 weeks with a 10-lb weight restriction. Full return to unrestricted activities occurred at 4 months.

The patient was followed for 4 months. At final follow-up, the patient’s visual analog pain scale score was 0 mm. Range of motion was 0° to 145° flexion with 30° supination and 80° pronation, measured with a goniometer. No heterotopic bone was visualized on postoperative radiographs. The patient had 5 out of 5 strength with flexion and 4+ out of 5 strength with supination. Supination testing was compared with the opposite extremity with the...
hand in neutral rotation. The distal biceps tendon was intact to palpation with a normal hook test result. The patient returned to work without restrictions. He received standard of care treatment and provided written informed consent for inclusion in this case report.

**DISCUSSION**

Similar to the recoil of a gun, when the distal biceps tendon ruptures, the tendon snaps proximally with significant force. At times, the force is sufficient to rupture the lacertus fibrosis. However, when the lacertus fibrosis remains intact, it can act as a tether at the midportion of the biceps tendon, causing the distal portion of the tendon to coil underneath the more proximal portion. Careful evaluation of the magnetic resonance imaging scan may show evidence of tendon coiling, which the current authors refer to as the “coil sign” (Figure 1). Within a few weeks after injury, the body forms a pseudosheath of scar tissue encasing the distal biceps tendon. This pseudosheath is significantly shorter than the actual tendon and can give the impression of an irreparable tear (Figure 2). Careful dissection of the pseudosheath can uncover a coiled native tendon that (Figure 3), when released, may allow for anatomic repair.

To determine the potential length lost from coiling of the distal biceps tendon, the authors performed a cadaveric dissection. An extensile approach to the antecubital fossa was performed to expose the distal biceps brachii tendon and its attachment to the lacertus fibrosis. The distal biceps tendon was released from the radial tuberosity, and the length between the tip of the tendon and the attachment of the lacertus fibrosis was measured (Figure 4). In this specimen, the distal biceps tendon extended 6 cm distal to the insertion of the lacertus fibrosis. Coiling of the distal biceps tendon from a tethering effect of the lacertus fibrosis could potentially lead to a loss of 6 cm of tendon. Failure to uncoil the tendon from scar tissue may lead to inability to perform anatomic distal biceps repair.

**CONCLUSION**

When the distal biceps brachii ruptures, the tendon recoils proximally. An intact lacertus fibrosis can tether the tendon, causing it to coil. With time, the body will encase the coiled tendon in scar tissue, forming a pseudosheath that may mimic the native tendon. Failure to identify coiling of the native tendon within the pseudosheath may lead to as much as 6 cm of shortening and can prevent anatomic repair.

**REFERENCES**