Upper-Extremity Thrombosis in a Patient After Biceps Tenodesis

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Abstract

Deep venous thrombosis (DVT) of the upper extremity is uncommon compared with DVT of the lower extremity. Exertional DVT has been described in some athletes, especially in the dominant arm of baseball players. It is important for health care professionals to recognize the signs and symptoms of upper-extremity DVT, which can occur after exertion or after surgery of the upper extremity. Superficial venous thrombosis is also very uncommon in the upper extremity. This article describes a case of superficial venous thrombosis that mimicked DVT in the surgical (right) arm of a recreational baseball player after suprapectoral biceps tenodesis for a painful superior labrum anterior-posterior lesion. Although the superficial venous system of the upper arm has frequent connections to the deeper basilar system, it is uncommon for superficial venous thrombosis to occur concurrently with DVT. It is important for clinicians to understand the distinction between superficial venous thrombosis and DVT in the upper extremity because the physical findings, treatment, and prognosis for these 2 entities differ in the following ways: (1) superficial venous thrombosis may be accompanied by a cord, but DVT is associated with more generalized swelling; (2) superficial venous thrombosis requires symptomatic treatment only, whereas DVT requires anticoagulation; and (3) superficial venous thrombosis typically resolves with few sequelae, whereas upper-extremity DVT increases the risk of future DVT. [Orthopedics. 2014; 37(12):e1133-e1136.]
Venous thromboembolism is recognized as an important cause of morbidity and mortality in hospitalized patients. Consequently, prevention of venous thromboembolism has received considerable attention from professional societies, accrediting agencies, and regulatory authorities. Although upper-extremity deep venous thrombosis accounts for up to 10% of all DVTs and is associated with pulmonary embolism and post-thrombotic syndrome, considerably less attention has been paid to this diagnostic entity compared with lower-extremity DVT. Similarly, recent interest in the management of superficial venous thrombosis with anticoagulation has focused almost exclusively on the lower extremity. Nevertheless, upper-extremity DVT and superficial venous thrombosis can lead to important and distinct complications.

Because of the perceived infrequency of upper-extremity DVT and its potential complications, including pulmonary embolism, little attention has been given to the development of a diagnostic algorithm and standard-of-care prophylaxis/treatment for upper-extremity thrombotic events. Therefore, the distinctions between upper-extremity DVT and superficial venous thrombosis and the appropriate treatments for each remain controversial. Consequently, the number of potentially dangerous cases of superficial venous thrombosis is underestimated, and the issues of reliable diagnosis and appropriate treatment of thrombotic events in the upper extremity need to be addressed.

The authors report a patient who had a superficial venous thrombosis after suprapectoral biceps tenodesis that presented a management dilemma based on whether an upper-extremity DVT was present. This case underscores the importance of distinguishing between superficial venous thrombosis and DVT, given their different prognostic implications and treatments.

Case Report

A 40-year-old male recreational baseball player presented to the authors’ orthopedic clinic for right shoulder pain that had begun 4 months previously after a fall at a water park slide. He had landed on an outstretched arm and experienced immediate pain in the right shoulder. He reported no episodes of instability and primarily experienced anterior shoulder pain that prevented him from playing in his league’s baseball games as a pitcher and outfielder. The symptoms were specifically reproduced by throwing a baseball; his pain was not aggravated by hitting the ball.

The medical history was notable for bilateral thoracic outlet surgery. The patient initially had paresthesias in both upper extremities. Workup with venous duplex ultrason sound showed marked occlusion of the axillary veins. He had no cervical ribs but underwent successful surgery to remove the first rib on the right side and then on the left side 1 and 2 years, respectively, before presentation to the authors’ clinic. The paresthesias subsequently resolved, and the patient considered the procedures successful. He reported no symptoms of extremity DVT or vascular compromise at initial presentation to the authors’ clinic.

On examination, the patient had no atrophy or deformity and had full, symmetric shoulder range of motion. Findings on neurovascular examination were entirely normal, with no edema or swelling. Results of Roos test, anterior cervical triangle compression test, and shoulder pinch test were negative. Result of an active compression test was positive and produced pain in the posterior and superior shoulder. He also had pain in the front of the shoulder with Speed’s test, a Kennedy-Hawkins impingement sign, a positive Neer impingement sign, a positive result on Whipple test, a positive result on bear hug test for pain, and a negative uppercut test result. Shoulder radiographs were normal. The patient was treated with nonsteroidal anti-inflammatory drugs for 2 months and underwent physical therapy with a structured exercise program to strengthen the rotator cuff and scapular stabilizer muscles.

He returned 4 months later and reported no change in pain. Findings on physical examination were unchanged from the first visit. Arthrogram magnetic resonance imaging scan showed a superior labrum anterior lesion–posterior (SLAP). The treatment options were discussed with the patient, and he elected to undergo arthroscopic surgery with the goal of performing SLAP repair or biceps tenodesis.

Surgery was performed under general anesthesia with the patient in the lateral decubitus position. His arm was held by an arm holder with only 5-lb traction to reduce axial distraction to the brachial plexus, vascular structures, or shoulder. Arthroscopic examination showed diffuse synovitis throughout the shoulder but no degenerative changes. The supraspinatus, infraspinatus, and subscapularis tendons were intact, with no partial tears. The biceps anchor appeared to be frayed, and subsequent probing found a type II combined variant of a SLAP lesion. The inferior pouch, posterior inferior labrum, posterior superior labrum, and middle glenohumeral ligament were normal.

Because of the patient’s age and because the major abnormality in his shoulder was a SLAP lesion, suprapectoral biceps tenodesis was performed. The biceps tendon was released from the superior labrum with electrocautery, and it was allowed to retract out of the joint. The superior labrum remnant was debrided to a stable margin to prevent mechanical symptoms. A small deltopectoral incision was then made 4 cm below the coracoid and lateral to the axillary fold. The interval between the deltoid and the pectoralis was developed until the tendon was located in the interval between the pectoralis major insertion and the inferior aspect of the bicipital groove (ie, suprapectoral). The tendon was tenodesed in this loca-
tion, in the interval above the pectoralis major insertion but just inferior to the tuberosities, under enough tension to allow good conformation of the muscle. It was secured with 2 absorbable suture anchors with nonabsorbable sutures. The repair was reinforced with several absorbable sutures to the superior aspect of the pectoralis major tendon. Postoperatively, the patient was discharged home with instructions to move the shoulder, elbow, wrist, and hand as tolerated. For DVT prophylaxis, he was given aspirin (81 mg) daily, typically prescribed by the authors for 3 weeks after surgery. The patient returned for a routine postoperative visit 8 days after surgery. He reported pain, swelling, and tenderness along the medial aspect of the right upper arm. He had no shortness of breath or chest pain. On examination, the incision had healed and there were no signs of infection. The patient had no redness, warmth, or drainage. He had local tenderness along a cord of vein along the medial side of the arm from the elbow to the axilla. Findings on vascular examination were otherwise normal. The patient had no swelling, and capillary refill, sensation, and pulses were normal.

The patient was sent to the emergency department for additional testing to rule out DVT. Duplex ultrasound showed a right basilic vein thrombus distal to the surgical incisions, without involvement of the deep brachial or axillary veins. The hematology service was consulted, and because the clot was superficial, anticoagulation was not recommended because of the patient’s recent surgical procedure. The patient was instructed to apply heat or ice locally to control pain. He was seen weekly in the office for 3 weeks and then monthly for 2 months. The palpable cord in the basilic vein resolved gradually without further sequelae. The patient was allowed biceps strengthening exercises 6 weeks postoperatively. He was allowed a gradual return to activity, and 3 months postoperatively he returned to playing baseball with no limitations.

**DISCUSSION**

This case illustrates 3 important clinical points: (1) a patient who has pain and swelling in an extremity postoperatively should undergo careful physical examination, and the physician must consider the wide variety of possible causes; (2) as in the lower extremity, thrombosis of the superficial and/or deep venous system can occur, and clinical suspicion of this entity warrants confirmatory radiographic studies; and (3) it is important to distinguish between superficial venous thrombosis and DVT because the prognoses and medical treatments differ.

This case report also serves as a reminder of the venous anatomy of the upper extremity. Typically, the brachial vein is considered deep and the basilic vein is considered superficial. In fact, the basilic vein, located in the medial aspect of the upper arm, is superficial distally but becomes deep proximally once it penetrates the fascia (Figure).

The distinction between superficial venous thrombosis and DVT can be difficult, especially if patients present with both at the same time. In the lower extremities, DVT has been found to exist concurrently with superficial venous thrombosis 28.8% of the time. The signs and symptoms of DVT typically are swelling of the extremity with some discoloration of the extremity. There may or may not be signs of venous congestion in an extremity with DVT. Typically, superficial venous thrombosis is not accompanied by swelling or discoloration of the extremity. In some cases, superficial venous thrombosis presents as a superficial...
venous cord that is easily palpated on physical examination. The authors were concerned that the current patient might have DVT because of his recent surgery and history of thoracic outlet syndrome. Other common causes of upper-extremity DVT include intravenous lines, cancer (especially with thoracic involvement), and hypercoagulable states, such as factor V Leiden, prothrombin gene mutation, protein C or S deficiency, and antiphospholipid syndrome. In the current case, the authors did not pursue thrombophilic testing because the patient had a clearly identifiable proximate cause for his thrombotic event. The operative reports for thoracic outlet surgery showed no evidence of vessel abnormality or injury at the time of surgery that might have predisposed this patient to subsequent venous thrombus.

**CONCLUSION**

Postoperative upper-extremity superficial venous thrombosis is uncommon. However, the diagnosis of venous thrombosis is inexact. Therefore, if there is any question as to the extent of a thrombus, duplex ultrasound is recommended. Generally, superficial venous thrombosis can be treated symptomatically once involvement of deeper venous structures has been excluded.

**REFERENCES**


