

Atraumatic Subclavian Vein Thrombosis in a Collegiate Baseball Player: A Case Report

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Objective: To introduce the case of a collegiate baseball player who suffered an atraumatic subclavian vein thrombosis. This case presents an opportunity to discuss the diagnosis and treatment of a 22-year-old male with a thrombosis of his right subclavian vein.

Background: Upper extremity deep venous thrombosis is an uncommon vascular problem, occurring primarily in young, healthy, active people. Although the history and symptoms are often unremarkable, the condition can lead to complications if not correctly recognized and appropriately treated. In this case, the athlete reported tightness in his right biceps muscle and upper back after sleeping on his shoulder. The patient denied substance abuse or illegal anabolic steroid use, and these possibilities were ruled out as factors in the diagnosis and treatment.

Differential Diagnosis: Shoulder tendinitis, thoracic outlet syndrome, primary upper extremity thrombosis of the right subclavian vein.

Treatment: After diagnosis, the patient was placed on blood thinners to dissolve the clot and referred to a vascular surgeon. The patient underwent a balloon angioplasty and later had the

first rib removed. A second clot formed, and a stent was placed in the vein after the clot was removed by medication and another angioplasty procedure. He developed a pulmonary embolism during the stent procedure and was sent postoperatively to the intensive care unit, where he underwent therapeutic anticoagulation. After 10 weeks of therapy, the patient stopped all anticoagulant medication and returned to school to play baseball.

Uniqueness: We present the atraumatic pathogenesis of a subclavian venous thrombosis in a young, active, and otherwise healthy college athlete with unremarkable predisposing factors. Within 24 hours after rib resection, the subclavian vein rethrombosed. The patient was thought to have experienced a small pulmonary embolus.

Conclusions: Individuals who participate in athletics can develop atraumatic upper extremity deep venous thrombosis. Therefore, it is important that team physicians and certified athletic trainers be prepared to recognize the signs and symptoms of this condition to institute prompt, appropriate treatment.

Key Words: Paget-Schroetter syndrome, heparin, urokinase, stent placement

Upper extremity deep venous thrombosis (UEDVT) is also known as thrombosis of the axillary-subclavian vein, or Paget-Schroetter syndrome. It is considered a relatively infrequent disorder that occurs predominantly in young, otherwise healthy people who participate in repetitive upper extremity activity.^{1–3} From an epidemiologic perspective, the general incidence of UEDVT remains low (approximately 2/100 000 persons per year), even though it is regarded as the most common vascular condition among athletes.^{4–5}

The purpose of this report is to illustrate the unique case of a collegiate baseball player who developed a primary upper extremity atraumatic subclavian vein thrombosis. Although we are not the first to describe this condition, certain exceptional aspects of this case resulted in a delay in diagnosis and treatment.

Ten days after initial complaints of tightness in his right biceps muscle and upper back after reportedly sleeping awk-

wardly on his shoulder, the patient was diagnosed with a primary UEDVT.

The initial symptoms were vague and misleading. Because of the lack of predisposing factors, underlying diseases, and trauma to the shoulder, the diagnosis was delayed. This report serves to remind clinicians of the important role of the certified athletic trainer (AT) in recognizing the clinical signs and symptoms associated with atraumatic thrombosis, so as to facilitate timely medical referral and treatment of this uncommon, yet potentially fatal condition. Individuals who participate in athletics can develop UEDVT, so team physicians and ATs must be aware of this rare condition.

CASE REPORT

A 22-year-old male collegiate baseball player presented to the athletic training room with complaints of tightness and soreness in his right shoulder. Initial physical examination was

performed by an AT. Patient history was unremarkable and included reports of playing baseball competitively from childhood all the way through 4 years at the collegiate level.

His recent history included reports of sleeping on the involved shoulder the night before and having played in a doubleheader baseball competition 2 days before presenting to the athletic training room. The patient played the left field position in the first game and was a designated hitter in the second game; he denied any mechanism of injury or pain during the games. It was later established by the AT that within the 10-week period preceding the presenting condition, the patient had participated in 43 practices, 16 games, and 123 innings as either an outfielder or designated hitter (71 at bats).

During physical inspection by the AT, the patient's right hand, upper arm, and posterolateral shoulder were observed to be swollen and red. Palpation revealed increased tissue temperature over the posterolateral shoulder. The patient's active range of motion was painful and limited in internal and external rotation. The military brace position, Neer shoulder impingement test, Roos test, Adson test, empty can test, and Apley scratch test were positive. Manual muscle tests of the anterior, posterior, and middle deltoid muscles; serratus anterior muscle; pectoralis muscle group; and rhomboid and supraspinatus muscles were negative. After evaluation, the patient was treated with massage and gentle stretching before receiving ice and high-frequency transcutaneous electric nerve stimulation to the posterolateral shoulder for pain modulation. The patient was referred by the AT to the orthopaedic clinic for follow-up evaluation the next day to rule out vascular involvement associated with possible thoracic outlet syndrome.

Orthopaedic evaluation resulted in a diagnosis of shoulder tendinitis (rotator cuff and bicipital tendinitis). Because of continued symptoms including edema and complaints of tightness, the patient was referred by the AT to student health services for additional evaluation to rule out vascular involvement.

Reports from student health services indicated no concern about vascular involvement and revealed no further diagnosis. After a resultant telephone consultation involving the AT and the team physician, the patient was cleared to bat during practice but was restricted from throwing activity.

Three days after evaluation by student health services, the patient continued to complain of intermittent tightness in the right shoulder. Evaluation by the AT revealed continued signs of swelling and redness in the right hand and arm, and the military brace position, Neer shoulder impingement test, Roos test, Adson test, empty can test, and Apley scratch test were positive. The AT instructed the patient to report back to the orthopaedic clinic for radiographs and follow-up evaluation to rule out possible vascular involvement.

Follow-up orthopaedic evaluation resulted in the diagnosis of possible rotator cuff tendinitis and possible labrum tear. The patient was given medical permission to practice as tolerated based on signs and symptoms. During this time, he continued to receive treatment consisting of heat, ice, and stretching. Due to the lack of a definitive diagnosis, the AT ceased electric modality treatments.

One week after the initial diagnosis, the patient returned to the athletic training room with increased edema and discoloration. The AT then referred the patient to a second orthopaedic physician and requested diagnostic tests be performed to rule out vascular concerns. The orthopaedist ordered magnetic resonance imaging and vascular consult. The patient un-

derwent the magnetic resonance imaging scan the following afternoon.

The next day, the patient returned to the orthopaedic clinic and was referred to a vascular specialist for consultation and duplex ultrasonography. At this time, the patient was diagnosed with primary UEDVT of the right subclavian vein. Immediately after the diagnosis of UEDVT, the patient began outpatient anticoagulant therapy and was referred to a vascular surgeon.

The next day, the patient was admitted to the hospital, where he underwent placement of a catheter with a urokinase drip for thrombolysis. After anticoagulation and catheter-directed thrombolysis, contrast venography was performed to assess stricture and the response to thrombolytic therapy. Venography revealed total occlusion of the right subclavian vein. The patient was then treated with balloon angioplasty of the subclavian vein.

Five days later, the patient underwent right transaxillary first rib resection to correct extrinsic vein compression. He was scheduled for vein stenting a few days later; however, 1 day after his surgery, he developed edema, increased pain in the right arm, ecchymosis of the chest wall, and new onset of right-sided chest pain. Chest radiographs showed areas of opaqueness and apical pleural thickening, indicating loculated effusion at the right apex of the chest wall. Repeat venography demonstrated occlusion from the development of a second blood clot. Because of the need for recovery time after resection of the first rib, the procedures necessary to remove the second blood clot with vein stenting could not be performed. While recovering from the rib resection surgery, the patient received heparin therapy.

Approximately 2 weeks after rib resection surgery, the patient underwent balloon angioplasty procedure for the second time. After surgery, venography was performed and a stent placed within the subclavian vein. During the procedure, the patient developed a small pulmonary embolism and was immediately treated. The patient was placed in the intensive care unit and monitored while receiving therapeutic anticoagulation. The patient was released from the hospital 2 days later and continued anticoagulant therapy as an outpatient. Outpatient rehabilitation entailed a cardiovascular therapeutic exercise program with no overhead activity.

One month after being released from the hospital, the patient underwent follow-up subclavian vein ultrasonography, which showed stent placement and venous outflow to the arm to be normal. Examination by the vascular surgeon found no swelling of the patient's arm and no abnormal venous pattern. The patient continued rehabilitation per the physician's instructions, gradually increasing upper body activity, weight lifting, and throwing.

Three months after hospital release, the patient returned for reexamination and follow-up imaging, which was normal. Approximately 5 months after primary UEDVT, the patient returned to school and participated in the nontraditional baseball season at the collegiate level. One year after initial development of the condition, the patient returned to normal physical activity, participated for the entire year without limitation, and helped lead his team to a second-place finish in the National Collegiate Athletic Association World Series.

DISCUSSION

Although early clinical recognition of UEDVT is important, diagnosis can be difficult due to its indeterminate cause and

indistinct pathophysiology. Upper extremity deep vein thrombosis is idiopathic in nature, and the pathogenesis and treatment of this rare vascular condition are controversial.^{3,6-8} The mechanism of injury is widely thought to be associated with repetitive, strenuous upper extremity activities.^{5,9-13}

Symptoms are nonspecific, ranging in severity, and may be position dependent. Occasionally, patients may be entirely asymptomatic.⁵ Most commonly, however, patient complaints include initial "heaviness" in the affected arm, as well as a dull ache and pain in the neck, shoulder, and/or axilla of the involved limb. The differential diagnosis is complex because patients with UEDVT typically display compressive signs usually associated with thoracic outlet syndrome.^{7,11-13} Other more dramatic signs may include ecchymosis and non-edematous swelling of the shoulder, arm, and hand; functional impairment; discoloration and mottled skin; and, distention of the cutaneous veins of the involved upper extremity.^{5,11,12,14}

It is important that ATs and team physicians are prepared to recognize the signs and symptoms of UEDVT, which is also known as effort thrombosis or Paget-Schroetter syndrome. In this patient, no predisposing factors, underlying diseases, or trauma to the affected shoulder were noted. Thorough, careful diagnostic evaluation is necessary because serious morbidity can result if this condition is not treated appropriately. As we emphasize in this case, the diagnosis was delayed because the initial symptoms were vague and misleading.

CONCLUSIONS

This case study serves as a reminder for ATs that athletes can develop UEDVT, a rare venous condition with potential for significant morbidity. Although this diagnosis is infrequently reported in sports medicine publications, the condition can cause a potentially dangerous or even fatal complication. Timely, accurate clinical recognition of the signs and symptoms of UEDVT is necessary to facilitate appropriate medical referral and treatment. Therefore, it is important for ATs to be familiar with the signs and symptoms of UEDVT.

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