Upper extremity deep venous thrombosis after shoulder arthroscopy: A case report

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Deep venous thrombosis (DVT) is a common complication after orthopaedic hip and knee surgery, and prophylaxis for prevention is often used. Upper extremity DVT is an extremely rare complication after shoulder surgery.[3,9,12,14] Overall, there has been an increased incidence and awareness of upper extremity DVT, and this has been attributed to malignancy and the use of central venous catheters, shunts for dialysis, and transvenous pacemakers.[4] The potential complications arising from upper extremity DVT include post-thrombotic syndrome (pain, stasis pigmentation, and edema), recurrent thromboembolism, and pulmonary embolism.[2,7] In up to one third of patients with an upper extremity DVT, a symptomatic pulmonary embolism may develop, which can be fatal.[1,2,8,10] Accurate diagnosis of an upper extremity DVT requires a high index of suspicion, and early treatment may reduce the risk of thromboembolic complications.

In our patient, an upper extremity DVT developed in the ipsilateral arm and a subsequent symptomatic pulmonary embolus developed after an arthroscopic superior labrum anterior-posterior (SLAP) repair in the beach-chair position.

CASE REPORT

A 43-year-old left hand–dominant man presented with left shoulder pain for the past 2 years. His primary complaint was that he could not throw overhead and had an audible click, preventing him from playing baseball with his children. Physical examination of his left shoulder showed full range of motion and equal strength compared with his right shoulder. He had negative cross-arm adduction, Speed's, apprehension, and impingement tests. He had a positive O'Brien's test. Shoulder radiographs were normal. A magnetic resonance imaging arthrogram confirmed a SLAP tear. After failure of a physical therapy program, the patient underwent operative intervention.

Left shoulder arthroscopy was performed with the patient in the beach-chair position under interscalene regional anesthesia. A type II SLAP lesion was encountered at surgery and repaired with 2 suture anchors stabilizing the superior labrum. The surgery was uncomplicated and performed within 1 hour. It is our standard protocol during shoulder arthroscopy to apply sequential compression devices on the lower extremities, but no other DVT prophylaxis is applied.

Seven days after surgery, the patient had pain and swelling of the operative extremity. The differential diagnosis for pain and swelling in an upper arm includes superficial phlebitis, cellulitis, contusions, muscle tears, intramuscular hemorrhage, gas gangrene, lymphedema, occult fracture, lymphangitis, allergy, and DVT.[17] An upper extremity Doppler ultrasound was performed and confirmed a DVT in the patient's brachial, medial antecubital, and distal cephalic veins. He was evaluated by an internist on the same day and started taking Lovenox (Aventis Pharmaceuticals, Bridgewater, New Jersey) until he was able to start taking warfarin (ie, when his international normalized ratio was between 2.0 and 3.0). He had no history of family DVT, did not smoke, and was not obese, and laboratory tests revealed no blood factor deficiencies or factor V Leiden. Despite taking warfarin for a week, he had shortness of breath develop and went to the emergency department. A ventilation-perfusion scan was obtained, confirming a pulmonary embolus, and the patient was admitted to the hospital for observation, supportive care including vital sign monitoring, oxygen therapy, and systemic thrombolysis with a 250,000-U bolus of streptokinase, followed by an infusion at 100,000 U/h, administered intravenously for 24 hours. After the start of treatment, the patient's symptoms improved, and once stabilized and comfortable, he was discharged from the hospital. He was treated for a total of 6 months with warfarin. A follow-up ultrasound was performed, which showed resolution of his DVT in the medial antecubital and distal cephalic veins and recannulation of the brachial vein. He is currently doing well with no pain in his shoulder, and he does not have post-thrombotic syndrome.

DISCUSSION

Venous thrombosis in the upper extremity is not as uncommon and as benign a disease process as previously reported.[2] Upper extremity DVT can be classified into primary and secondary types.[17] Primary upper extremity DVT, also known as Paget-Schroetter syndrome or idiopathic upper extremity DVT, is a rare entity (2/100,000 persons per year). It typically occurs in young, healthy male persons

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after strenuous occupational or sporting activities. The extreme repetitive exertion causes vessel intima damage and activation of the coagulation cascade. Secondary upper extremity DVT develops in patients with central venous catheters, pacemakers, or malignancy and accounts for the majority of cases of upper extremity DVT. Other secondary causes of hypercoagulable states include lupus, pregnancy, nephrotic syndrome, surgery and immobilization, and protein S, protein C, and antithrombin III deficiency.[17]

Thromboembolic complications after arthroscopic shoulder surgery are rare when compared with knee arthroscopy. Schippinger et al[13] prospectively evaluated 101 consecutive knee arthroscopy patients with ultrasound, phlebography, and lung scanning. There were 12 cases of DVT or pulmonary embolism, for an incidence of 11.9%. Demers et al[6] found the incidence to be as high as 17.9% after knee arthroscopy, with the use of a thigh tourniquet during surgery possibly contributing to this higher percentage. Wirth et al,[16] in a controlled randomized trial, evaluated 239 patients undergoing knee arthroscopy. There were 6 patients who showed evidence of a DVT. In the active treatment group of low–molecular weight heparin, a DVT developed in only 1 patient, as compared with 5 in the control group.

The causes of upper extremity DVT in relation to shoulder arthroscopy have not been determined. The case report of Burkhart[3] revealed an underlying Hodgkin's lymphoma, which was associated with a hypercoagulable state. Starch et al[14] reported on a 73-year-old man who underwent an open subacromial decompression in the beach-chair position. An upper extremity DVT developed in the ipsilateral arm, and a pulmonary embolism occurred 7 days after surgery. This report questioned whether intraoperative or postoperative arm positioning had a role in the development of the DVT. Polzhofer et al[12] reported on a case of an upper extremity DVT that resulted after they performed a subacromial decompression with the patient in the lateral position. The patient did have a comorbidity of obesity and was given Mono-Embolex (Novartis Pharma, Nuremberg, Germany) subcutaneously once per day while in the hospital. Seven days after surgery, the patient had a pulmonary embolus. The authors believed that the use of a motorized shaver during the subacromial decompression may have irritated the subclavian vein. Other possible sources of subclavian vein irritation include improper positioning of the arm, excessive traction of the arm, or fluid-induced soft-tissue swelling causing compression. Cornwall and Yang[5] reported on the development of an upper extremity DVT after antegrade femoral nailing with the patient in the supine position. The right arm was positioned across the patient's chest and stabilized with a sheet. The patient had no other injuries. Within 24 hours after surgery, the patient had extreme right upper extremity pain and swelling and color-flow Doppler ultrasonography revealed a large thrombus of the right proximal subclavian vein. The authors believed that positioning of the arm during surgery contributed to the development of the DVT. They tested their hypothesis on a male patient undergoing contrast venography. They positioned the arm in various positions to determine the effect on venous flow. The only position that showed distinct venous compression was cross-body adduction, and this compression was relieved when a bolster was placed on the chest.

The patient and clinician need to be aware of the signs and symptoms of an upper extremity DVT and have a high index of suspicion for its diagnosis. Most often, pain and progressive shoulder or upper extremity swelling are associated with DVT.[15] Color-flow Doppler ultrasonography or magnetic resonance venography is used to confirm the diagnosis. Early detection and treatment of upper extremity DVT may decrease morbidity and mortality rates. There is no treatment protocol for upper extremity DVT because of the lack of cases and good prospective studies comparing treatment modalities. Therapeutic modalities include anticoagulation, thrombolysis, and invasive techniques, such as local catheter-guided thrombolysis, percutaneous mechanical thrombectomy, and open surgical thrombectomy.[1,11,17] The goal of treatment is to limit patient discomfort and symptoms, as well as to prevent post-thrombotic syndrome and pulmonary embolism. The frequency of post-thrombotic syndrome ranges from 7% to 46%, with a weighted mean of 15%.[7] A review of 218 cases of upper extremity DVT found a 12.4% prevalence of pulmonary embolism.[8] Becker et al[1] reported on 329 patients with a proven venous thrombosis of the upper extremity and found a prevalence of pulmonary embolus of 9.4% and a 1% prevalence of fatal pulmonary embolism. The actual prevalence of pulmonary embolism may be higher, as many emboli are not clinically apparent.[2] Appropriate anticoagulation therapy is initiated, and medical and vascular surgery consultations are obtained to determine whether thrombolytics or invasive techniques (or both) would benefit a particular patient.

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