

Axillary-Subclavian Venous Thrombosis following a weightlifting injury in an elderly patient: a case report

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Background: *Axillary-subclavian venous thrombosis (ASVT) is a type of upper extremity deep vein thrombosis (UEDVT). UEDVTs are classified as either primary or secondary depending on their etiology. Although uncommon, clinicians should be aware of the clinical presentation of UEDVT as timely diagnosis and early treatment is critical in preventing possible post-thrombotic complications.*

Case presentation: *We report a rare case of axillary-subclavian and internal jugular vein thrombosis in the absence of clear risk factors in a 78-year-old male weightlifter who presented to the office with two-week duration of left upper extremity pain and swelling following strenuous exercise at the gym.*

Thrombose veineuse axillaire-sous-clavière à la suite d'un exercice intense chez un patient âgé : un rapport de cas
Contexte: *La thrombose veineuse axillaire-sous-clavière (TVAS) est un type de thrombose veineuse profonde du membre supérieur (TVPMS). Les thromboses veineuses profondes du membre supérieur sont classées comme primaires ou secondaires selon leur étiologie. Bien qu'elles soient peu fréquentes, les cliniciens doivent connaître la présentation clinique de la thrombose veineuse profonde du membre supérieur, car un diagnostic et un traitement précoces sont essentiels pour prévenir d'éventuelles complications post-thrombotiques.*

Exposé de cas: *Nous présentons un cas rare de thrombose de la veine axillaire-sous-clavière et de la veine jugulaire interne en l'absence de facteurs de risque clairs chez un haltérophile de 78 ans qui s'est présenté à la clinique avec une douleur et un gonflement du membre supérieur gauche survenus deux semaines après un exercice physique intense à la salle de sport.*

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Summary: *The combination of unusual thrombi location, in addition to the unusual absence of existing thoracic-outlet compression or indwelling medical hardware, makes our case of UEDVT especially uncommon. Clinicians should be aware of this rare disease due to the debilitating effects both in the short and long term.*

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KEY WORDS: deep vein thrombosis, axillary-subclavian venous thrombosis, Paget-Schroetter syndrome, upper extremity deep vein thrombosis, chiropractic

Résumé: *La combinaison de la position inhabituelle des thrombus, en plus de l'absence inhabituelle de compression de l'orifice inférieur du thorax ou de matériel médical à demeure, rend notre cas de thrombose veineuse profonde du membre supérieur particulièrement rare. Les cliniciens doivent connaître cette maladie rare en raison de ses effets débilissants à court et à long terme.*

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MOTS CLÉS : thrombose veineuse profonde, thrombose veineuse axillaire-sous-clavière, syndrome de Paget-Schroetter, thrombose veineuse profonde du membre supérieur, chiropratique

Introduction

Chiropractors and manual therapists should be aware of and consider non-mechanical conditions in their differential list, as these can sometimes mimic the signs and symptoms of common musculoskeletal injuries seen following exercise and a missed diagnosis may lead to health consequences. Deep vein thrombosis is one such condition. Upper extremity deep vein thromboses (UEDVT) are classified as either primary or secondary depending on the underlying etiologic cause.¹⁻⁴

Effort-induced thrombosis classically occurs in otherwise healthy, physically active individuals between the ages of 14 to 45 following strenuous use of their upper extremity.¹⁻⁵ The pathophysiology involves chronic repetitive compression of the subclavian vein as it passes through the costoclavicular space between the clavicle, first rib, anterior scalene, subclavius and costoclavicular ligament.⁵ One proposed hypothesis is that repetitive microtrauma of the tunica intima leads to progressive venous scarring and focal stenosis, leading to turbulent blood flow and activation of the coagulation cascade.^{4,8,9} Secondary UEDVTs are classified as such because of the presence of a predisposing factor which can cause turbulence in laminar flow, venous compression or state of hypercoagulability.^{6-8,10} These may take the form of intravascular devices such as implanted medical ports or central venous lines; however, tumours, and other space-occupying lesions have also been implicated in increasing

the risk of UEDVT.^{3,9-11} Most cases of secondary UEDVT occur in older patients with pre-existing medical conditions.¹⁰

Accurate detection of patients with deep vein thrombosis is crucial to chiropractors and other therapists. Deep vein thromboses often presents as swelling, redness, and dilated veins in the affected limb, accompanied by a patient's report of heaviness and discomfort.^{1,3,7} Symptoms mimic those of common musculoskeletal injuries or nerve entrapments, making the diagnosis challenging. The importance of early detection and diagnosis is critical, as untreated UEDVTs can result in life threatening pulmonary emboli and chronically disabling post-thrombotic syndrome.^{3,4,7} We report a rare case of left axillosubclavian vein and internal jugular thrombosis in a 78-year-old male who presented to a chiropractic clinic after developing arm pain following his gym workout.

Case presentation

A 78-year-old right-handed male sought chiropractic care for pain in his left bicep and anterior shoulder region. The onset was two-weeks prior while performing behind-the-neck pull-up exercises at the gym. He was prompted to seek care when he began to develop swelling of the left arm one week after the initial injury. This man had excellent muscle development due to his lifelong passion (50+ years) of bodybuilding. Prior to this presentation, he had been seen in the clinic for lower back and hip related pain.

His past-medical history was significant for a partial tear of the left biceps long head, along with a surgical history of two prior rotator cuff tendon repair. He had no history of thoracic outlet syndrome or venous thrombosis. He was not taking any medications and was not being monitored for any other health conditions.

Physical examination revealed enlargement of the left arm as compared to the right (Figures 1 and 2). The left biceps circumference measured 34 cm while right biceps circumference measured 30 cm and the left forearm circumference measured 31 cm while the right forearm circumference measured 27.5 cm. The skin of the upper chest and extremity were of normal colour and there was no evidence of distended superficial veins (i.e. Urschel Sign). Manual muscle testing of the deltoid, pectoralis, latissimus, bicep, and rotator cuff were all 5/5 and painless. Upper extremity deep tendon reflexes were graded 2+ bilaterally and crude touch sensory testing was intact and equal bilaterally. There was no palpatory pain of the proximal bicep, pectoralis, or rotator cuff. Cervical spine active range of motion was symmetrical and painless. Radial pulses were intact bilaterally. Thoracic outlet testing was not performed. The patient had not reported shortness of breath, increased coughing, or blood in their sputum, reducing the immediate concern of a pulmonary embolism. The patient was advised to go to the emergency room at the local hospital due to the suspicion of venous thrombosis.

A Doppler ultrasound (US) was performed in the emergency room which showed several nonocclusive thrombi; a 2.6 cm segment extending from the axillary vein into the subclavian vein, a 4.0 cm segment extending from the subclavian vein into the junction with the internal jugular vein, and a short segment in the internal jugular vein. In addition to the vascular findings, the ultrasonography report also described a “chronic subluxation and near complete tear of the proximal aspect of the long head of the biceps.” Finally, a hematoma measuring 7.3 x 5.5 x 3.4 cm was reported, likely resulting from the adjacent bicep tear. Following the initial US study, the patient was treated with thrombolytic medications, a three-month course of anti-coagulant medications, and was scheduled for a follow-up US two weeks later which showed a reduction in thrombus size.

A three-month follow-up US showed a persistent short segment (1.2 cm) nonocclusive thrombus in the distal



Figure 1.
View of anterior upper extremity showing swelling of left arm.



Figure 2.
View of posterior upper extremity showing swelling of left arm.

left internal jugular vein beyond the confluence with the subclavian vein. The remaining previously visualized thrombi and the hematoma were resolved. He returned to weight training with no pain, swelling or recurrence of symptoms. At eight-months post-injury, the patient had returned to weightlifting without pain or complications.

Discussion

The diagnosis of UEDVT is made by correlating current and past medical history with typical clinical findings followed by appropriate imaging. Patients typically present with unilateral swelling of their extremity, redness, and possible dilation of the superficial vessels of the shoulder

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or anterior chest.^{7,8,10} They may complain of neck, shoulder, or arm pain, and commonly report a feeling of heaviness or fatigue and possible paresthesia in the extremity.^{7,10} Because these signs and symptoms may be similar to those associated with other common musculoskeletal injuries or peripheral nerve entrapments and because patients themselves may misinterpret their cause, clinicians must be cautious not to overlook UEDVT in their differential list.^{6-8,10} While more common conditions such as traumatic muscle injuries or radiculopathy can present with pain, swelling and feelings of heaviness of the involved extremity, the presence of diffuse arm swelling, discoloration or venous dilation should alert clinicians to the possibility of DVT. Additionally, UEDVT should not be ruled out based on the age of the individual or mechanism of injury as effort-induced thrombosis is common in otherwise young healthy individuals.^{2,4,13,14}

In this case, the patient had no pre-existing history or indication of thoracic outlet syndrome and radiographic imaging did not show indication of anatomic abnormalities which would have resulted in compression of the subclavian space. This, combined with the patient's age, makes the possibility of effort-induced thrombosis or Paget-Schroetter syndrome unlikely. However, during a phone conversation, the vascular surgeon posited the presence of the hematoma adjacent to the axillary-subclavian vein as a likely source of venous pressure leading to stasis. A large hematoma, as was involved in this case, could act as a space-occupying lesion resulting in limited venous blood flow. We would therefore suggest that this case could be characterized as a secondary UEDVT. The patient's age (78 years) was likely an additional risk factor.

Imaging

Imaging plays a crucial role in the diagnosis and classification of UEDVT. The reference standard for diagnosis is currently contrast venography; however, due to the invasiveness and exposure to ionizing radiation, alternative imaging tests are preferred.¹⁵ Doppler US has been suggested as a first-choice modality due to its low cost, high availability and high sensitivity and specificity (84-95% and 93-96% respectively).^{5,15} In cases where direct visualization of the subclavian vein is difficult, contrast-enhanced computed tomography (CT) or magnetic resonance imaging (MRI), can be useful but must be specifically set to image the venous phase.⁵ They may also

be used to image the anatomy of the subclavian space to assess for possible venous compression.¹⁵ Following their systematic review in 2010, Di Nisio *et al.*¹⁵ concluded that due to the paucity of available studies, additional research of high methodologic quality is required before US can replace venography as the reference standard. In the subject of this case study, venography was not performed, leaving the possibility of venous stenosis at the costo-clavicular space in question.

Pulmonary embolism

If the diagnosis of UEDVT is missed or treatment is delayed, complications can arise such as a life-threatening pulmonary embolism. These occur when pieces of thrombus break-off and travel to the lungs, blocking blood flow to sections of the lungs. Compared to lower extremity DVTs, the reported risk of clinically noticeable pulmonary embolism from a UEDVT is relatively low, between 5-8%, with a reported mortality rate of 0.7%.¹⁶ It is estimated that, following a UEDVT, up to 36% of cases will have subclinical presentation of pulmonary embolisms.¹⁷

Post-Thrombotic Syndrome

Post-Thrombotic Syndrome (PTS) is a chronic and disabling condition which manifests due to persistent venous insufficiency following a DVT event.^{18,19} The symptoms can range from mild pain and swelling to severe, chronic pain, uncontrolled edema and even venous ulcers.^{20,21} Even when treated appropriately with anticoagulation therapy, post-thrombotic syndrome occurs in 12-25% of individuals following UEDVT.^{19,22,23} Generally speaking, the earlier the diagnosis and treatment, the better the results.^{24,25} Unsurprisingly, dominant arm PTS is associated with reduced quality of life compared to non-dominant arm PTS.¹⁹

Management

Medical management of UEDVT is urgent, with the primary goal being to reduce venous obstruction as well as reducing the risk of pulmonary embolism and post thrombotic syndrome.²⁶ The initial management phase lasts five to 15 days and typically includes the use of thrombolytic and anticoagulative medications.²⁶ A three-month course of anti-coagulation treatments is typical during this period of elevated risk.²⁶

The role of allied health professionals such as chiro-

practitioners is to recognize the signs and symptoms of this serious condition and immediately refer for emergency care. Any delay in management significantly increases the risk of pulmonary emboli and post thrombotic syndrome.^{24,25}

Surgery

In cases of effort-induced thrombosis, surgical treatment is often considered within four to six weeks following the thrombotic episode to avoid recurrent thrombosis.⁵ However, in cases of secondary UEDVT, surgery is rarely considered because it is accepted that while the medical implants increase the risk of thrombosis, they are serving a purpose and are inherently removeable.²⁷ Delays in surgical treatment beyond several weeks to months may promote re-thrombosis and fibrous scarring within the axillary vein, leading to chronic venous symptoms, reducing the efficacy of the delayed surgery.^{5,24-27}

Summary

It is important for clinicians to include UEDVT in their differential when evaluating patients experiencing upper extremity pain and swelling following strenuous exercise. While more common conditions such as traumatic muscle injuries or radiculopathy can present with pain, swelling and feelings of heaviness of the involved extremity, the presence of diffuse arm swelling, discolouration or venous dilation should alert clinicians to the possibility of DVT. Early detection of thrombosis is critical as the risk for post-thrombotic syndrome or pulmonary embolism increases if treatment is delayed.

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