

DVT & PE in Athletes The Hidden Danger

Central Connecticut State University
32nd Sports Medicine Symposium
March 14th, 2017
Abigail Tillman MD PGY-4
Middlesex Hospital Family Medicine Residency

Disclosures

I have no conflicts of interest to report

Objectives

- Differentiate DVT and PE
- Recognize the risk factors for DVT/PE
- Recognize the common signs and symptoms of DVT and PE
- Understand training room and on-field initial management
- Understand long term complications of diagnosis and treatment of DVT/PE in athletes

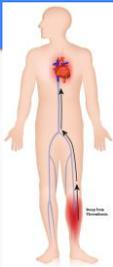
Overview

- Overview of venous thromboembolic disease
- Lower extremity DVT & PE
- Upper extremity DVT (Paget-Schroetter Syndrome)

Spectrum of Venous Thromboembolic Disease

Upper Extremity DVT

3rd most common life threatening cardiovascular disease
Annual incidence 1-2 per 1,000 people
Mortality rate is 60,000-100,000 per year
Half of patients develop complications
1/3 of patients have recurrence within 10 years



Pulmonary embolism
1/3 of patients present with PE

Lower Extremity DVT
1/3 of patients present with LEDVT

Famous People with DVT/PE

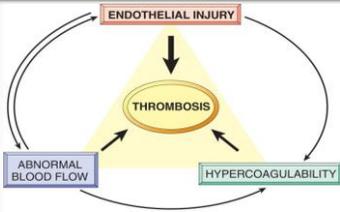
Serena Williams - PE in 2011 after period of immobilization for foot injury



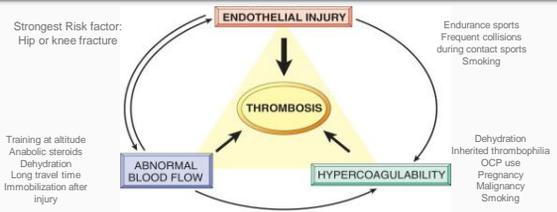
Famous People with DVT/PE



How does a DVT form? Virchow's Triad



How does a DVT form? Virchow's Triad



Lower Extremity Deep Vein Thrombosis & Pulmonary Embolism

Lower Extremity DVT: History & Physical

- Unilateral diffuse swelling
- Calf tenderness
- Warmth
- Low grade fever
- Homan's sign: calf pain with forced dorsiflexion
 - 60-88% sensitive, 30-72% specific



Lower Extremity DVT: Differential Diagnosis

- | | |
|--|---|
| Sports Injuries | Medical Diagnoses |
| <ul style="list-style-type: none">• Medial Tibial Stress syndrome• Chronic exertional compartment syndrome• Stress Fractures• Popliteal artery entrapment syndrome• Lower extremity nerve entrapment• Achilles tightness• Complex regional pain syndrome | <ul style="list-style-type: none">• Trauma• Infection• Peripheral arterial disease• Venous disease |
| | <p>*DVT can co-exist with any of these diagnoses</p> |

Lower Extremity DVT: Management

If you suspect then refer to medical provider for testing

Compression US is screening test of choice

Pulmonary Embolism: History & Physical

Common Complaints

- Chest pain, may be worse with inspiration
- Dyspnea, may worsen with exertion
- Cough

Physical Exam findings

- Tachycardia (may not occur in athletes)
- Hypoxia
- Tachypnea
- Syncope
- Hypotension

Less Common

- Hemoptysis
- Fever
- Cyanosis

Pulmonary Embolism: Differential Diagnosis

- Pneumonia
- Asthma
- Bronchitis
- Viral URI
- Pneumothorax
- Cardiac etiology
- Chest trauma



Pulmonary Embolism: Management

Hemodynamically Unstable

- Call 911!
- Respiratory support, supplemental oxygen

Hemodynamically Stable

- Referral to medical provider for advanced imaging
- CT angiography is initial test of choice if there is high clinical suspicion for PE

Lower Extremity DVT & Pulmonary Embolism: Treatment

- Anticoagulation
 - Prevents extension of thrombus, embolization, relieves acute symptoms, reduces risk of long-term complications
 - Duration minimum of 3 months
- Early ambulation
- No evidence to support use of compression stockings to prevent post-thrombotic syndrome
- Return to play
 - No contact while on anticoagulation
 - Should be determined through collaboration with trainer and physician
 - No well-established protocols exist

Lower Extremity DVT & PE: Complications

Deep Vein Thrombosis

- if DVT is untreated there is a 50% risk of PE
- 40% of patients with proximal DVT have co-existing PE
- Lifetime risk of recurrence 20-30%
- Post thrombotic syndrome
 - Due to chronic venous obstruction
 - manifests as leg heaviness, chronic leg pain, swelling, cramping

Pulmonary Embolism

- 70% of patients with PE have coexisting DVT
- Mortality rate
 - 58% Hemodynamically unstable
 - 15% Hemodynamically stable

Should we screen for VTE during Preparticipation exam?

- During preparticipation exam ask about...
 - High altitude training
 - Drug use, prescription and illegal (anabolic steroids, erythropoetin, nutritional supplements)
 - Personal and family history of VTE
- If significant risk factors or family history the athlete should be screened for thrombophilias

Lower Extremity DVT & Pulmonary Embolism: Take Home Points

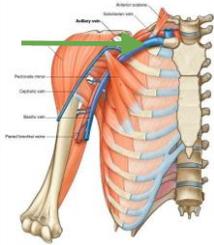
- VTE can happen in athletes despite being young, healthy and active
- There are many aspects of exercise and competitive sports that increase risk for VTE
- DVT and PE often coexist
- If you suspect DVT or PE refer to medical provider for further work up
- If patient presents with unstable vital signs or syncope call 911 and provide supportive care

Upper extremity DVT in Athletes Paget Schroetter Syndrome (effort thrombosis)

Upper extremity DVT (UEDVT)

Definitions

- Primary: thrombus in subclavian and axillary veins that occurs as complication of strenuous upper extremity activity or complication of Thoracic outlet syndrome (TOS) or occurs spontaneously in the absence of risk factors
- Secondary: develops due to an underlying cause, usually cancer or indwelling catheters



Incidence

- Total UEDVT: 16 per 100,000 people per year
- Primary UEDVT: 2 per 100,000 (~3000-6000 reported cases per year)

Paget-Schroetter Syndrome

- Venous thrombosis in subclavian and axillary vein associated with strenuous and repetitive activity of the upper extremity
- Described by James Paget in 1875 and Leopold von Schroetter in 1884



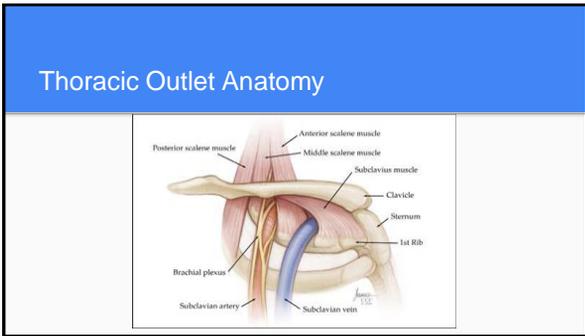

Background on Paget-Schroetter Syndrome

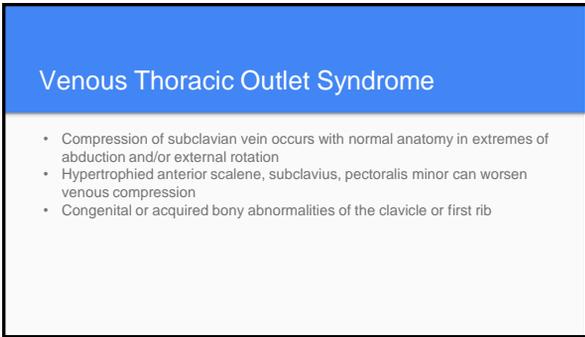
Epidemiology

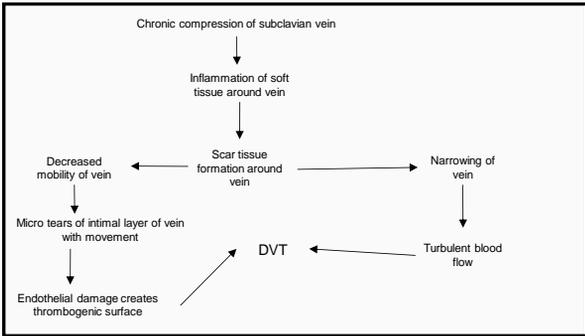
- 2 per 100,000 people per year in US
- 60-80% of patients report vigorous overhead activity
- Dominant arm
- Most commonly presents in males ages 18-30

Overhead activities

- Swimmers
- Baseball & softball
- Wrestling
- Hockey
- Weightlifting
- Golf
- Martial arts
- Backpacking
- Billiards
- Manual labor







Paget-Schroetter Syndrome: History

- Timing of presentation
- Usually present after complete occlusion of vein occurs
 - 24 hours after heavy activity of upper extremity
- Common complaints
- Exercise fatigue
 - Heaviness, pain
 - Complains of loss of velocity or control
 - "Dead arm"

Paget-Schroetter Syndrome: Differential Diagnosis

- Arterial or neurogenic TOS
- Rotator cuff injury
- Occult fracture
- Neuropathy or neuritis
- Vasculitis
- Pancoast tumor
- Primary malignancy of head, neck or arm or metastatic disease
- Infection
- Lymphatic disorder
- Cervical nerve root compression
- Complex regional pain syndrome
- SVC syndrome

Paget-Schroetter Syndrome: Physical exam

- Blue or dusky of arm
- Prominent superficial veins in extremity and neck
- Asymmetry of upper extremities
- May be able to palpated hard linear structures in axilla that is thrombosed vein
- Perform good arterial and neurological exam



Paget-Schroetter Syndrome: Management Options

- Treatment is aimed at preventing complications
- Various treatment options that can be used alone or in combination
- Optimal treatment and timing is controversial
- Choice of treatment depends on...
 - Age
 - Duration of thrombus
 - Desire to return to previous level of activity
 - Presence of PE
 - Presence of thrombophilia

Paget-Schroetter Syndrome: Conservative Management

- Arm elevation + Anticoagulation
- May be appropriate for:
 - nondominant limb
 - isolated event involving unusually strenuous activity
 - older age
 - Clot present >2 weeks
 - no systemic factors that predispose to DVT
- Anticoagulation for minimum of 3 months
- May need lifelong anticoagulation because underlying anatomical problems not corrected
- Associated with high incidence of post thrombotic syndrome

Paget-Schroetter Syndrome: Invasive Management

- Catheter directed thrombolysis
 - Success of recanalization of vein depends on largely on time from clot formation to surgery
 - 50% of veins treated at 6 weeks were partially opened, none completely opened
- Surgery: resection of first rib or medial clavicle +/- scalenotomy to achieve decompression of thoracic outlet
- Better for...
 - younger patients
 - dominant limb
 - desire to continue sport activity, unwilling to accept chance of restricted movement
 - clot present <2 weeks
- Can combine catheter-directed thrombolysis with surgery
- Anticoagulation for 3-6 months after recanalization and decompression

Paget-Schroetter Syndrome: Return to Play

- No contact sports while on anticoagulation
- No well-established protocols
- Can do passive ROM while on anticoagulation
- Consensus opinion - can return to play 12 weeks after definitive treatment and discontinuation of anticoagulation

Paget-Schroetter Syndrome: Take Home Points

- Overhead athletes most at risk
- May present with vague symptoms that have been persistent
- Early recognition and diagnosis is key! The earlier treatment is initiated the better prognosis for return to play and decreased incidence of complications

Thank you!

Kathy & Tom for inviting me
Librarians at Middlesex Hospital - Nancy Goodwin & Janis Leird
Middlesex Hospital Family Medicine Residency

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