



Venous Thromboembolism and Marathon Athletes

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Venous thromboembolism (VTE) is the collective term for deep vein thrombosis and pulmonary embolism, both of which constitute globally significant public health burdens. Because awareness of VTE is key to its prevention,¹ efforts to disseminate advisory and educational information among medical professionals and the population at large, with specific resources for at-risk groups, remain crucial.

VTE in Athletes: The Need for Heightened Awareness

The benefits of moderate and regular exercise for the general adult population are indisputable. However, for the marathon athlete who trains intensively and for long periods of time, several thrombogenic (causing or resulting in thrombosis) risk factors exist (see Table 1).

Why Are Athletes at Risk of VTE?

In 1884, Rudolph Virchow proposed that risk of VTE could be grouped using a triad related to (1) the efficiency

of blood flow, (2) the integrity of blood vessels, and (3) the physical composition of blood itself (Figure).

How Can Athletes Reduce the Likelihood of Deep Vein Thrombosis and Pulmonary Embolism?

Preventive measures to reduce the likelihood of deep vein thrombosis and pulmonary embolism in athletes are much the same as those recognized for the adult population as a whole.¹⁻³ However, in view of the general lack of awareness about the risk of VTE in marathon runners (including among athletes themselves), specific awareness and advisory points are also necessary^{4,5} (see Table 2). Signs and symptoms that the marathon athlete should be aware of are given in Table 3, and diagnostic considerations for the medical practitioner are given in Table 4.

Return to Training

Because it is usual for athletes to follow specific training routines when injured and because adherence to

prescribed targets can help rationalize the anxiety associated with rehabilitation, the guidelines given in Table 5 for marathon athletes are useful.

Additional Resources

- National Blood Clot Alliance (NBCA). Stop the Clot. <http://www.stoptheclot.org/News/article126.htm>. Accessed June 2013.

Disclosures

None.

References

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Table 1. Athlete-Specific Risk Factors for VTE

Dehydration and hemoconcentration (decrease of the fluid content of the blood with increased concentration of red blood cells)

Injury and inflammation, including microtrauma to blood vessel walls

Immobilization during long-distance travel, including long car/coach journeys and long-haul flights between popular events (eg, the Boston [US], London [UK] and Paris [Europe] marathons)

Use of estrogen contraceptives during training and around competitive events

Low heart rate (bradycardia) and blood pressure affecting the circulation and possibly exacerbating venous stasis (Figure)

Congenital abnormalities affecting the anatomy of the veins

Thoracic outlet obstruction: an extra (cervical) rib or excess muscle/tendon tissue can compress the upper chest (subclavian) vein that drains the blood from the arm; obstruction and repeated trauma/strain to the vein can result in upper extremity deep vein thrombosis

May-Thurner syndrome (narrowing of the major left pelvic vein)

Narrowing or absence of the inferior vena cava (the main vein in the abdomen)

VTE indicates venous thromboembolism.

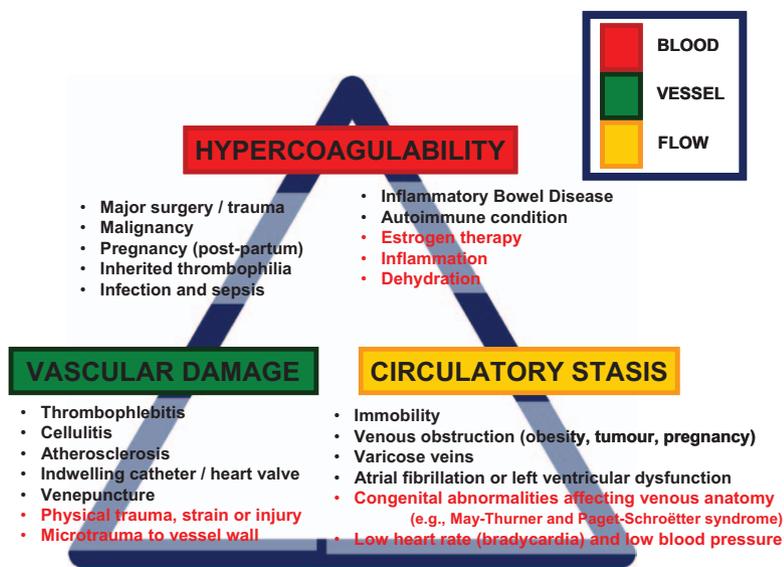


Figure. Virchow's triad of risk factors for venous thromboembolism (VTE). Factors in red are associated with heightened risk in marathon athletes. Note that athlete-specific factors are present in all 3 sections of the triad; a cumulative risk of VTE in certain individuals is entirely possible.

Table 2. Preventive and Prophylactic Measures

Identify and manage any hereditary prothrombotic conditions through dialog with your healthcare practitioner.

Be vigilant to thirst as an indicator of dehydration. Avoid excessive consumption of caffeinated drinks and alcohol. Replenish both water and electrolytes during and after training.

Always plan and remember to take breaks to move/perform leg and upper body stretches during long car/coach journeys.

Wear compression stockings during long-distance air travel.

Avoid sitting in a cramped position and crossing legs at the knee and the ankle.

Consider using contraceptives that do not contain estrogen (eg, the progestogen-only pill) with a family planning specialist.

Taking prophylactic aspirin may be a viable option, but always seek medical advice.

Most important, listen and respond to your body. Pain is not a barrier to overcome through greater endurance but an indicator of an underlying problem. If something does not feel right, stop training and seek medical advice.



Table 3. Signs and Symptoms for VTE

Deep vein thrombosis

Swelling, usually in 1 leg, often visible in the calf and ankle

Leg pain or tenderness or the sensation of chronic cramping that does not ease with ice, stretching, or painkillers; inactivity may exacerbate pain, and activity may alleviate pain

Reddish or blue skin discoloration (often obvious when bathing with hot water)

Leg warm to touch

Unexplained upper arm or neck swelling (upper extremity deep vein thrombosis)

Pulmonary embolism

Sudden shortness of breath or breathlessness on exertion

Rapid heart rate

Cramp in side or chest, painful breathing

Chest pain radiating to the shoulder

Fever

Unexplained cough, sometimes with bloody mucus

Feeling lightheaded and dizzy or fainting

VTE indicates venous thromboembolism.

Table 4. Key Awareness Points for the Medical Practitioner

VTE can and does affect athletes.

Athlete-specific factors are present in all 3 sections of the Virchow triad (Figure); a cumulative risk of VTE in certain individuals is entirely possible.

Maintain a high index of suspicion for all sports injuries in athletes, especially when faced with differential diagnosis.

Be aware that pulmonary embolism can cause unexplained or sudden shortness of breath; associated leg pain (deep vein thrombosis) may or may not be present.

Clots can occur anywhere in the body, including upper limbs.

Because of their body conditioning (muscle tone and low body mass index), high level of baseline fitness (bradycardia), and pain tolerance (compensation), be aware that athletes may present atypical symptoms or sequelae.

Despite the physical presentation and psychological determination of the endurance athlete, always remain mindful of the old adage: To be fit does not mean to be healthy.

VTE indicates venous thromboembolism.

Table 5. Return-to-Training Advice

Refrain from training for 1 month after deep vein thrombosis diagnosis until the clot has adhered to the blood vessel wall and the risk of pulmonary embolism has decreased.

Anticoagulation therapies increase the risk of bleeding; contact, impact, and high-intensity sports that increase the risk of physical trauma should be avoided.

High risk: cycling (on- and off-road cycling), boxing, rugby, baseball, soccer.

Low risk: power walking, running (moderate), swimming, controlled conditioning exercises in the gym.

Wear individually fitted compression stockings to reduce the long-term risk for postthrombotic syndrome.