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BACKGROUND

VTEs are closely associated with sports. An injury can lead to thrombosis. Surgery can also increase the risk of clots.

METHODS

A systematic literature was conducted. This included over 150 published athletic VTE case descriptions across multiple case series. These sources evaluated underlying physiological mechanisms, sport-specific risk factors, and diagnostic biomarkers associated with the development of venous thromboembolism in athletic populations.

RESULTS

- Exercise exerts a protective effect on the hemostatic system. Sport may increase VTE risk in athletes, including:
 - Hemoconcentration induced by intense exertion
 - Immobilization following sports injuries
 - Frequent long-distance travel
 - Dehydration
 - Oral contraceptive use
 - Symptoms were isolated pain, swelling, edema, contributing to delayed diagnosis. Injuries that cause Thoracic Outlet Syndrome (38%), Hereditary Thrombophilia (16%), Repetitive Overhead Activity (12%), and Other (34%), Figure 1.

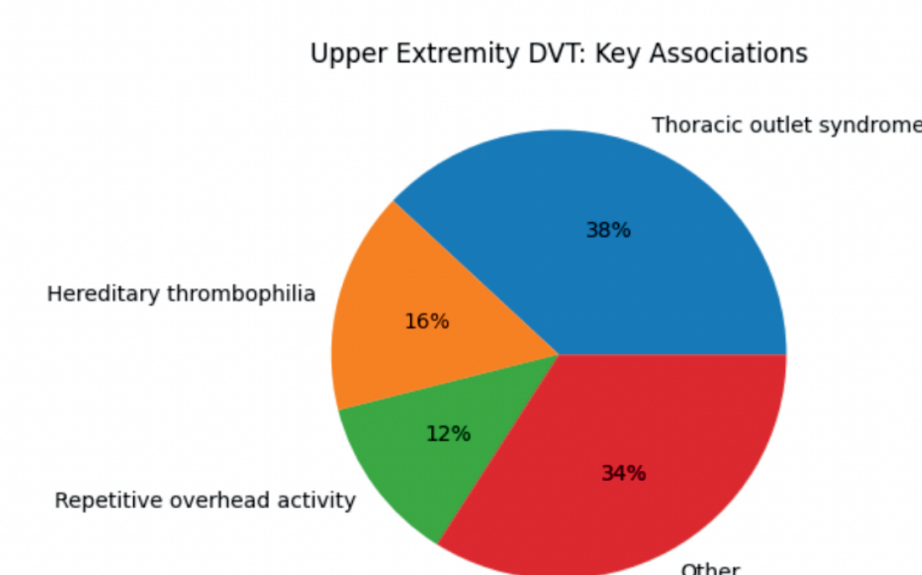


Figure 1: Upper extremity DVT

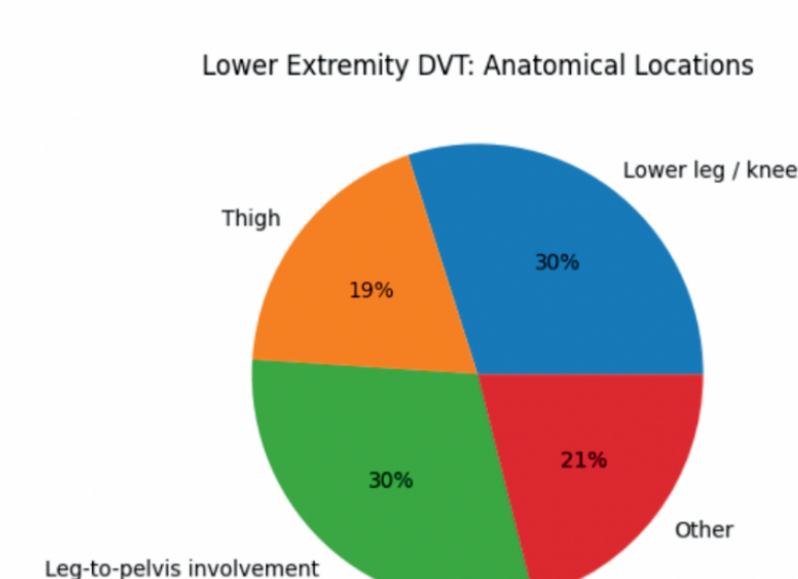


Figure 2: Anatomical distribution of lower extremity deep vein thrombosis (DVT) in sport-related cases.

RESULTS CONT.

Lower extremity DVT has Hereditary thrombophilia (30%), trauma (25%), Immobilization (21%), and other (24%) as the aetiological factors (Figure 3).

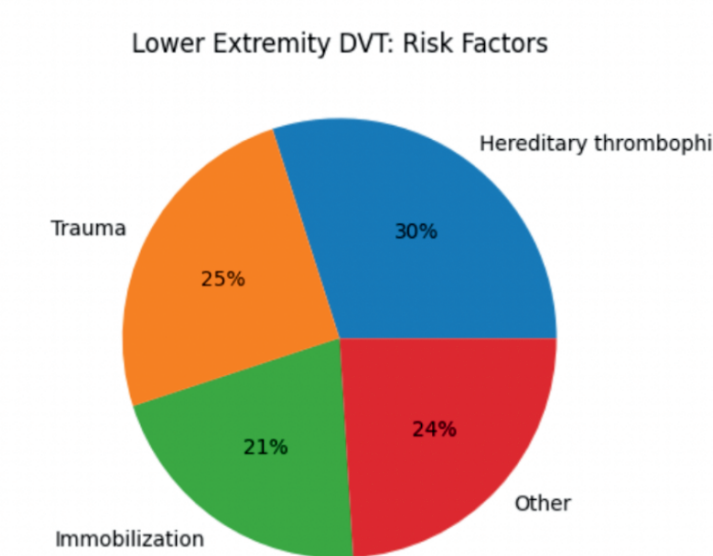


Figure 3: Risk factors associated with lower extremity DVT.

With anticoagulation, majority of athletes were able to return to sport. Upper extremity DVT was associated with faster return vs pulmonary embolism. Relationship between exercise intensity and VTE risk remains inconclusive. Anticoagulant therapy remains the gold standard treatment.

BIOMARKERS OF THROMBOSIS

No single biomarker has been shown to be diagnostic for VTE. Interpretation is limited due to overlap with musculoskeletal injury, exercise-induced inflammation, and delayed clinical presentation. D-dimer demonstrates very high sensitivity (>95%) but low to moderate specificity. Factor VIII shows moderate sensitivity with low to moderate specificity. Thrombin generation markers, which reflect activation of the coagulation cascade, demonstrate moderate sensitivity and specificity, though evidence is still emerging. Inflammatory biomarkers such as cytokines and leukocyte count may be elevated due to endothelial activation or systemic inflammation.

FAMOUS ATHLETES WHO SUFFERED FROM VTE

Damian Lillard (NBA): Diagnosed with DVT, treated with anticoagulation, and successfully returned to professional play. Sarah Franklin (Volleyball): Upper extremity VTE associated with repetitive overhead activity and quadrilateral space syndrome.



Figure 4: Damian Lillard



Figure 5: Sarah Franklin

RISKS OF VTE FOR ATHLETES

Athletes are not inherently at a higher risk of blood clots than the general population; however, their increased exposure to specific risk factors can elevate their likelihood of thrombosis. Intense exertion can cause hemoconcentration and dehydration, both promoting clot formation. Studies show that athletes who restricted fluids during exercise (0.5 L/hr vs. 1 L/hr) had approximately 2x higher D-dimer levels, indicating increased clotting activation. Repetitive trauma and inflammation, particularly in collision and high-impact sports such as baseball, hockey further predispose athletes DVT.

The relative risk of VTE increases with increasing duration of immobility, as shown in Figure 7.

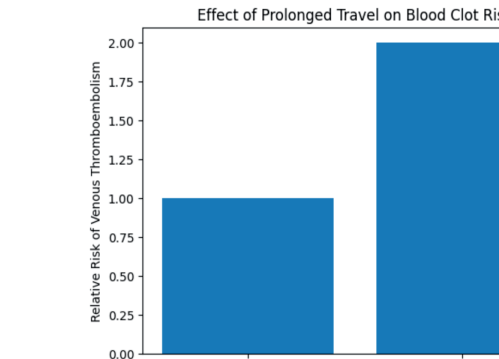


Figure 7: As the duration of immobility changes, the risk of VTE goes up.

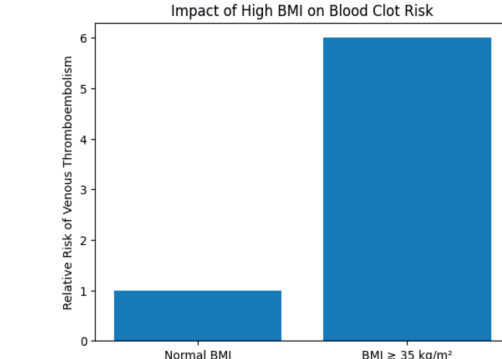


Figure 8: The risk of VTE as BMI increases

As BMI increases, the risk of VTE rises proportionally (Figure 8)

As the time after a VTE event increases, the risk of a recurring VTE event increases as well (Figure 9)

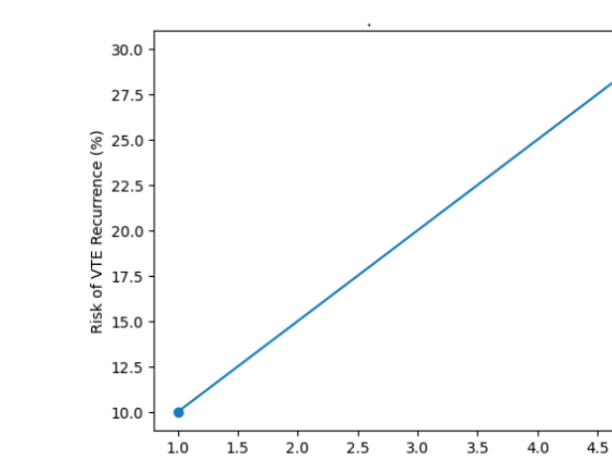


Figure 9: The risk of a recurring VTE event vs years after the initial event

MANAGEMENT OF VTE IN ATHLETES

Anticoagulant therapy is the gold standard VTE management. Extended anticoagulation (>6 months) lowers recurrence but increases harm, recurrent DVT is modestly reduced, while major bleeding risk doubles and mortality increases. Thrombolysis may be considered in select young, low-bleeding-risk patients needing rapid recovery.

CONCLUSION

DVT is often seen in athletes due to the risk factors such as prolonged travel times. These risks in combination with genetic factors can be a dangerous threat, athlete-specific guidelines, better biomarkers, and active anticoagulation therapy can greatly decrease the risk of DVT in athletes by leading to an earlier diagnosis.