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When clots go rogue: Deep dive into deep vein thrombosis (DVT).

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Introduction

Deep Vein Thrombosis (DVT) is a potentially life-threatening condition that occurs when a blood clot forms in a deep vein, typically in the legs. While clotting is a natural defense mechanism to prevent bleeding, DVT represents a pathological twist—where clots form without injury and obstruct normal blood flow. If left untreated, DVT can lead to serious complications, including pulmonary embolism (PE), chronic venous insufficiency, and post-thrombotic syndrome. Understanding the causes, symptoms, diagnosis, and treatment of DVT is essential for effective prevention and management [1].

DVT arises from a disruption in the balance of three physiological factors known as **Virchow's Triad**:: Reduced blood flow due to immobility, prolonged sitting, or bed rest. Damage to the inner lining of blood vessels from trauma, surgery, or inflammation. Increased tendency of blood to clot due to genetic mutations, cancer, pregnancy, or medications like oral contraceptives. These factors can act independently or synergistically to trigger clot formation in deep veins, most commonly in the lower extremities [2].

Increased risk of future clotting events. Result from long-term venous insufficiency. The primary goals of DVT treatment are to prevent clot extension, PE, and recurrence. Key approaches include: Used for initial treatment; fast-acting and administered intravenously or subcutaneously. A vitamin K antagonist requiring regular INR monitoring. Rivaroxaban, apixaban, and dabigatran offer fixed dosing and fewer interactions. Reserved for severe cases or massive PE, thrombolytics like alteplase dissolve clots but carry a high bleeding risk. Used in patients who cannot take anticoagulants, these filters prevent clots from reaching the lungs. DVT can affect anyone, but certain individuals are at higher risk: Long flights, hospitalization, or sedentary lifestyle. Especially orthopedic procedures involving the hips or knees. Malignancies and chemotherapy increase clotting risk. Hormonal changes and venous compression elevate risk. Conditions like Factor V Leiden mutation and prothrombin gene mutation. Both contribute to vascular inflammation and stasis. Risk increases with age, particularly after 60 [3].

DVT often develops silently, but when symptoms do appear, they may include: Swelling in one leg (or arm), Pain or tenderness, often starting in the calf, Warmth and redness over the affected area, Leg fatigue or heaviness. In some cases, DVT may be asymptomatic until it leads to a pulmonary embolism—a sudden blockage in the lungs that can cause chest pain, shortness of breath, and even death [4].

Timely diagnosis is critical to prevent complications. Common diagnostic tools include: Measures fibrin degradation products; elevated levels suggest clot formation. The gold standard for detecting clots in deep veins. An invasive imaging technique used when ultrasound is inconclusive. Useful in detecting clots in pelvic or abdominal veins. Clinical scoring systems like the Wells Score help assess pre-test probability and guide further testing. Occurs when a clot dislodges and travels to the lungs, potentially fatal. Chronic pain, swelling, and skin changes due to damaged veins [5].

Conclusion

Help reduce swelling and prevent PTS by improving venous return. Preventing DVT is often more effective than treating it. Strategies include: Early mobilization after surgery or hospitalization, Hydration during long travel. For many, DVT is a chronic condition requiring long-term management. Patient education is vital: Understanding medication adherence, Recognizing signs of recurrence, Managing bleeding risks, Regular

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follow-ups with healthcare providers. Support groups and digital health tools can empower patients to take control of their condition.

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