

Pulmonary Thrombosis Diagnosis Treatment and Prevention in High Risk Patients

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DESCRIPTION

Pulmonary thrombosis, commonly known as Pulmonary Embolism (PE), is a potentially life-threatening condition characterized by the obstruction of the pulmonary arteries by a blood clot. It primarily arises when a thrombus, usually formed in the deep veins of the legs or pelvis—a condition termed Deep Vein Thrombosis (DVT) dislodges and travels to the lungs. While pulmonary thrombosis can affect individuals of any age, high-risk patients, such as those with a history of thrombophilia, prolonged immobility, cancer, recent surgery, obesity, or advanced age, are particularly vulnerable. Understanding the complications and management strategies in these patients is critical to reducing morbidity and mortality.

Pulmonary thrombosis can lead to a spectrum of complications, ranging from mild respiratory distress to sudden death. The most immediate and severe complication is hemodynamic instability, which occurs when a large embolus obstructs the pulmonary circulation, reducing blood flow to the lungs and decreasing cardiac output. This can lead to acute right ventricular failure, as the heart struggles to pump blood against the high resistance caused by the clot. If untreated, this can rapidly progress to cardiogenic shock and death.

Another serious complication is pulmonary infarction, where portions of lung tissue die due to inadequate blood supply. Although less common, this can result in pleuritic chest pain, hemoptysis (coughing up blood) and long-term pulmonary scarring, which may impair lung function. In high-risk patients, the likelihood of recurrent thrombosis is also elevated, particularly if underlying risk factors such as malignancy or thrombophilic disorders are present. Recurrent events increase the risk of Chronic Thromboembolic Pulmonary Hypertension (CTEPH), a condition marked by persistent high blood pressure in the pulmonary arteries, progressive shortness of breath and right heart strain.

High-risk populations, including elderly patients or those with comorbidities like heart failure, diabetes, or chronic kidney disease, are more susceptible to secondary complications such as systemic hypoxemia, multi-organ dysfunction and prolonged

hospitalization. Moreover, in patients who require anticoagulation therapy, there is a delicate balance between preventing clot progression and avoiding bleeding complications, which adds an additional layer of risk in management.

The management of pulmonary thrombosis in high-risk patients involves prompt diagnosis, risk stratification, anticoagulation therapy and sometimes interventional or surgical procedures. Early recognition is vital, as delayed treatment significantly increases mortality. Clinicians often use clinical scoring systems such as the Wells score or the Pulmonary Embolism Severity Index (PESI) to assess the probability of PE and determine the urgency of intervention. Diagnostic imaging, particularly CT pulmonary angiography, remains the gold standard for confirming the presence and extent of pulmonary thrombi.

Anticoagulation therapy is the cornerstone of treatment. High-risk patients are typically started on fast-acting anticoagulants such as low molecular weight heparin, unfractionated heparin, or Direct Oral Anticoagulants (DOACs). These medications prevent further clot formation and reduce the risk of recurrent events. Long-term anticoagulation is often required for patients with persistent risk factors, such as cancer-associated thrombosis or inherited clotting disorders.

In cases of massive pulmonary thrombosis causing hemodynamic instability, thrombolytic therapy may be considered to rapidly dissolve the clot. For patients in whom anticoagulation or thrombolysis is contraindicated, mechanical thrombectomy or the placement of an Inferior Vena Cava (IVC) filter may be necessary to prevent further embolization. Supportive care, including oxygen therapy and hemodynamic monitoring, is essential in managing hypoxemia and maintaining organ perfusion.

Prevention plays an equally important role in high-risk patients. Measures such as early mobilization after surgery, prophylactic anticoagulation, compression stockings and lifestyle modifications like weight management and smoking cessation can significantly reduce the incidence of thromboembolic events. Regular follow-up is important to monitor anticoagulation therapy, detect recurrent thrombi early and

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manage long-term complications such as pulmonary hypertension.

CONCLUSION

Pulmonary thrombosis in high-risk patients is a complex medical condition with potentially severe complications, including right heart failure, pulmonary infarction and chronic pulmonary hypertension. Timely diagnosis, appropriate

anticoagulation and modified interventional strategies are essential to reduce morbidity and mortality. Equally important is the prevention of recurrence through lifestyle interventions and prophylactic measures. With vigilant management and early intervention, even high-risk patients can achieve favorable outcomes, highlighting the critical role of awareness, risk assessment and comprehensive care in combating pulmonary thrombosis.