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Peter S. Marshall and Wassim H. Fares

## **Clinical Probability Tools for Deep Venous Thrombosis, Pulmonary Embolism, and Bleeding** 473

Eileen M. Harder, Omkar Desai, and Peter S. Marshall

Overdiagnosis of venous thromboembolism is associated with increasing numbers of patient complications and health care burden. Multiple clinical tools exist to estimate the probability of pulmonary embolism and deep venous thrombosis. When used with D-dimer testing, these can further stratify venous thromboembolism risk to help inform the use of additional diagnostic testing. Although there are similar tools to estimate bleeding risk, these are not as well validated and lack reliability.

## **Prevention of Deep Vein Thrombosis and Pulmonary Embolism in High-Risk Medical Patients** 483

Megan McCullough, Cyrus Kholdani, and Roham T. Zamanian

Venous thromboembolism accounts for significant morbidity and mortality in patients with acute medical illnesses requiring hospital admission. American College of Chest Physicians guidelines recommend prophylaxis with heparins as first line and mechanical methods as second line. The risk of major bleeding with anticoagulants is less than 1% and not significantly different between agents. Although data support the use of all heparins, there is a trend toward superiority of low-molecular-weight heparins (LMWHs). Because acute illness and immobility do not end at hospital discharge, extended-duration therapy with LMWHs and direct oral anticoagulants remains under investigation.

## **Diagnosis of Deep Venous Thrombosis and Pulmonary Embolism: New Imaging Tools and Modalities** 493

Farbod Nicholas Rahaghi, Jasleen Kaur Minhas, and Gustavo A. Heresi

Imaging continues to be the modality of choice for the diagnosis of venous thromboembolic disease, particularly when incorporated into diagnostic algorithms. Improvement in imaging techniques as well as new imaging modalities and processing methods has improved diagnostic accuracy and additionally are being leveraged in prognostication and decision-making for choice of intervention. In this article, the authors review the role of imaging in diagnosis and prognostication of venous thromboembolism. They also discuss emerging imaging approaches that may in the near future find clinical usefulness in improving diagnosis and prognostication as well as differentiating disease phenotypes.

## **Intraluminal Arterial Filling Defects Misdiagnosed as Pulmonary Emboli: What Else Could They Be?** 505

Anastasiia A. Rudkovskaia and Debabrata Bandyopadhyay

Pulmonary artery filling defects can be observed in various pathologic processes other than pulmonary embolism, for example, nonthrombotic pulmonary embolism with biological and nonbiological materials and intrinsic pulmonary artery lesions. They have also been described in rare conditions, such as fibrosing mediastinitis

and congenital absence or stenosis of pulmonary artery, and some pulmonary parenchymal and airway malignancies. Misdiagnosis is common owing to the relative rarity of these conditions. Correct diagnosis is based on the appropriate clinical suspicion considering the unique clinical features, laboratory findings, and additional radiologic clues inferring a pathology other than pulmonary embolism.

**Venous Thromboembolism in Special Populations: Preexisting Cardiopulmonary Disease, Cirrhosis, End-Stage Renal Disease, and Asplenia** 515

Quyen Nguyen and Belinda N. Rivera-Lebron

Venous thromboembolism (VTE) is a common cause of morbidity and mortality. Presence of preexisting conditions, such as cardiopulmonary diseases, cirrhosis, renal dysfunction, and asplenia, commonly occurs in patients with VTE. Moreover, these conditions often are risk factors for developing VTE. These preexisting conditions make VTE diagnosis and treatment challenging and worsen outcomes. Current guidelines do not include detailed features in the diagnosis and management of patients with preexisting conditions. This article discusses presence of VTE in patients with preexisting cardiopulmonary diseases, cirrhosis, renal dysfunction, and asplenia.


**Pregnancy and Pulmonary Embolism** 525

Christopher Deeb Dado, Andrew Tobias Levinson, and Ghada Bourjeily

Venous thromboembolism (VTE), referring to both deep vein thrombosis and pulmonary embolism, is a leading cause of death in the developed world during pregnancy. This increased risk is attributed to the Virchow triad, inherited thrombophilias, along with other standard risk factors, and continues for up to 6 to 12 weeks postpartum. During the peripartum period, women should be risk stratified and preventive measures should be initiated based on their risk. Diagnostic tests and treatment strategies commonly used in VTE differ in pregnancy. An understanding of these differences is imperative to diagnose with confidence and to treat appropriately.

**Challenges and Changes to the Management of Pulmonary Embolism in the Emergency Department** 539

Chris Moore, Katelyn McNamara, and Rachel Liu

 Video content accompanies this article at <http://www.chestmed.theclinics.com>.

The diagnosis and treatment of pulmonary embolism (PE) remains one of the great challenges of emergency medicine. The symptoms of PE are myriad, common, and nonspecific. Undertesting risks missing a potentially life-threatening illness, whereas overtesting adds cost, false-positive diagnoses, incidental findings, and potential adverse impacts from contrast and radiation. Once diagnosed, the severity of PE can range from truly insignificant to deadly, and treatment must be tailored appropriately to the situation. This article discusses basic tenets of emergency department diagnosis and management while highlighting current challenges and recent changes to PE treatment.

**The Value of Bedside Echocardiogram in the Setting of Acute and Chronic Pulmonary Embolism** 549

David W. Lee, Kavitha Gopalratnam, Hubert James Ford III, and Lisa J. Rose-Jones

Echocardiography is valuable in the evaluation and risk stratification of patients with acute and chronic pulmonary embolism (PE). Patients with acute PE who have

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