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Review Article

## Etiology and treatment of acute inferior vena cava thrombosis



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ABSTRACT

Inferior vena cava thrombosis (IVCT) is a rare but severe disease that is associated with a high rate of mortality. IVCT can be categorized into primary versus secondary thrombosis dependent upon the underlying pathophysiology. The diagnosis includes both clinical probability assessment as well as the imaging evaluation. The optimal therapeutic strategy remains the target of continued research. Although anticoagulation therapy remains fundamental in treating IVCT, its inherent limitations have led to the use of minimally invasive, endovascular treatment options, including transcatheter thrombolysis, mechanical thrombectomy or a combination of these techniques. This review focuses on the etiology, diagnostic assessment, and endovascular treatment options for IVCT.

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Abbreviations: DVT, deep vein thrombosis; PE, pulmonary embolism; VTE, venous thromboembolism; PTS, post-thrombotic syndrome; CTPH, chronic thromboembolic pulmonary hypertension; IVCT, inferior vena cava thrombosis; BCS, Budd–Chiari Syndrome; CDT, catheter-directed thrombolysis; CT, computed tomography; MRI, magnetic resonance imaging; MRA, magnetic resonance angiography; PMT, pharmacomechanical thrombolysis.

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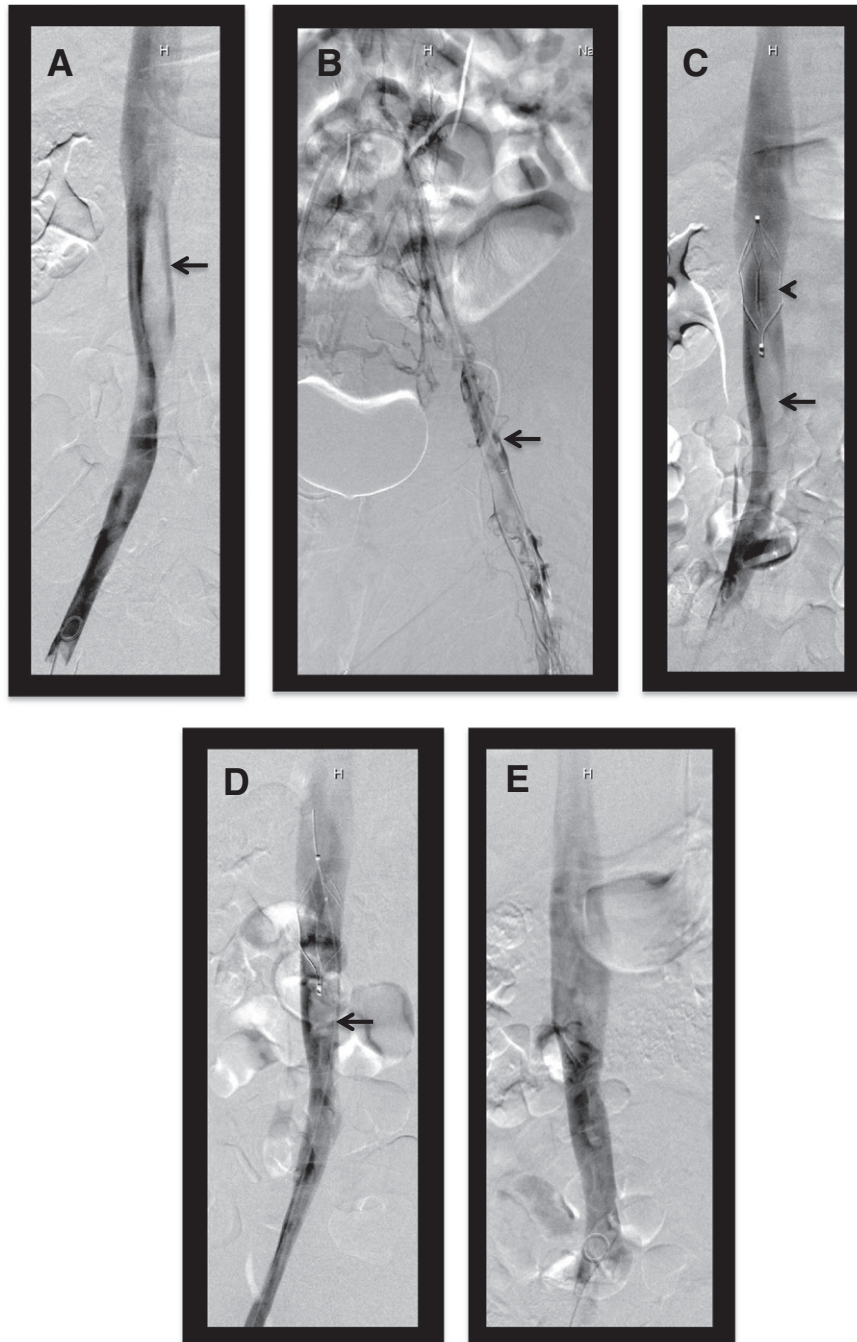
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## 1. Introduction

Deep vein thrombosis (DVT) and pulmonary embolism (PE) constitute venous thromboembolism (VTE), a leading cause of mortality and morbidity that affects over 2 million people in the United States each year [1–3]. VTE can have serious chronic sequelae in the form of post-thrombotic syndrome (PTS) and chronic thromboembolic pulmonary hypertension (CTPH), which can significantly compromise quality of life. Although DVT most commonly occurs in the lower extremities [4], rarely, thrombus can also form in the inferior vena cava (IVC).

IVC thrombosis (IVCT) can be in the setting of isolated thrombus, or propagation from the iliac veins. The incidence of isolated IVCT is

extremely low [5,6] and is commonly associated with outflow obstruction of the IVC, such as Budd-Chiari Syndrome (BCS), IVC anomalies or from external compression by a mass or hematoma. Although the data associated with the morbidity and mortality of VTE is widely reported [1–3], little is known about IVCT. As IVCT can be clinically silent and may become only revealed after sudden and fatal PE, the annual incidence of IVCT is difficult to determine [7,8]. It is intuitive that DVT in the form of IVCT has a relative higher incidence of PE compared with isolated lower extremity DVT. Indeed, approximately one-third of VTE episodes manifest as PE with or without DVT [3] which suggests an overall underestimation of IVCT in the literature (Fig. 1).



**Fig. 1.** Left lower extremity DVT and IVC thrombosis in a 26-year-old man. (A) Digital subtraction trans-catheter venography via right femoral vein shows massive thrombus floating within infrarenal IVC (arrow); (B), Transcatheter venography shows extensive thrombosis in left femoral, external (arrow) and common iliac veins. (C), A filter (OptEase) (arrowhead) was placed into IVC above the thrombus (arrow). (D), Follow-up venography via thrombolytic catheter shows partial lysis of thrombosis (arrow). (E), Repeated venography shows complete lysis of thrombosis after further mechanical and chemical thrombolysis with alteplase and retrieval of the filter.

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