

Thrombosis

Thrombosis is the formation of a blood clot within the vasculature, and can occur both within the arterial and venous systems. It contributes to a variety of conditions, including myocardial infarction, stroke, pulmonary embolism (PE), and limb ischemia. This specialized issue will cover topics related to thrombosis, largely focused on venous thrombotic conditions.

Venous thromboembolism (VTE) is a condition which includes deep vein thrombosis (DVT) and PE most commonly, but also includes thromboses of other vessels, such as the portal or splenic vein. VTE is a disease process which carries significant morbidity and mortality (1). Acute sequelae include sudden death and complications from anticoagulation. Longer-term sequelae include post-thrombotic syndrome (PTS) in up to 50% of patients and chronic thromboembolic pulmonary hypertension (CTEPH) in approximately 3% (2-4). Despite treatment, recurrence remains high; over 10% of patients recur at 1- and 10-year recurrence rates approach 30% (5,6). VTE also carries a high mortality rate. A recent large cohort study demonstrated 30-day mortality of 3% for DVT and 31% for PE. At 1 year, DVT mortality was 13% and 20% for PE (7).

VTE can be caused by a variety of inherited or acquired conditions which influence coagulation, including inherited coagulopathies, advanced age, obesity, trauma, surgery, infection, malignancy or pregnancy (8-13). After reaching sufficient clinical suspicion for VTE, diagnosis can be confirmed with imaging. Ultrasonography is the standard modality for DVT diagnosis, while computed tomography angiography is recommended for PE. First line treatment generally consists of systemic anticoagulation (14). However, if there are contraindications to anticoagulation, complications or failure of anticoagulation therapy, placement of an inferior vena cava filter is recommended (15). Adjunct therapies may be appropriate in the proper clinical setting. These include systemic lytic therapy, catheter-directed thrombolysis, thrombectomy (pharmacomechanical, aspiration or surgical), and stenting (16-20). Careful risk stratification is needed to determine patients best suited for further interventions beyond systemic anticoagulation (14,21).

Prevention and treatment of thrombosis is also an important concern to maintain patency of stents, fistulas, and grafts. Although drug-eluting stents have decreased the incidence of coronary artery stent thrombosis, the event still carries high mortality of 20–48% and myocardial function rates of 60–70% (22). Proper treatment of arteriovenous fistula thromboses and transjugular intrahepatic portosystemic shunt (TIPS) thromboses is important to preserve function vital to the health and survival of the patient with renal or hepatic failure.

The topic of thrombosis is explored in further detail in this specialized focused issue. Review of thrombus pathogenesis is provided by Monie *et al.* (23). Stone *et al.* detail the pathogenesis, diagnosis and management of DVT (24). Catheter-directed treatments are explored for VTE; Fleck *et al.* perform a review of the literature and practice considerations for catheter-directed thrombolysis of DVT (25), while Naidu *et al.* discuss the rationale for catheter-directed therapy in PE (26). Exploring the role of cancer and thrombosis, Quencer *et al.* discuss its incidence, imaging, prognosis and treatment (27). In an original article, Oklu *et al.* determine that although neutrophil extracellular traps are increased in cancer patients, they are not associated with venous thrombosis (28). This edition also provides updated reviews on rare syndromes such as May-Thurner and Paget-Schroetter Syndrome (29). Finally, this edition provides reviews of both *in vitro* (30) and animal models (31) of thrombosis as ongoing research is needed to further reduce this condition's morbidity and mortality.

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