

Preface

Thrombosis and Hemostasis Issues in Critically Ill Patients

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Hemostatic abnormalities are commonly found in critically ill patients. In these patients, a myriad of altered coagulation parameters are readily measurable, such as thrombocytopenia, prolonged global coagulation times, reduced levels of coagulation inhibitors, or high levels of fibrin split products. Hemostatic abnormalities in critically ill patients require swift and appropriate identification of their primary cause, since many of these disorders may require dissimilar therapeutic management strategies that may have a major impact on the outcome.^{1,2} In this issue of *Seminars in Thrombosis & Hemostasis*, we focus on common clinical situations involving hemostasis and thrombosis in patients on the intensive care units. In a series of articles on this subject, several disease states that have an impact on coagulation with major clinical relevance are discussed, diagnostic strategies are reviewed, and therapeutic management options are appraised.

Sepsis is a very frequently occurring reason for admission to the intensive care unit and in patients with sepsis coagulation may have a central role.³ There is ample evidence that a deranged coagulation status plays a role in the pathogenesis of sepsis, and patients with sepsis may present with both thrombotic or hemorrhagic complications, in its most extreme form manifesting as disseminated intravascular coagulation. Such derangement may importantly contribute to organ failure in critically ill patients and may also affect mortality. The central role of endothelium in the pathogenesis of sepsis, organ dysfunction, and death is further highlighted in a study by Johansen et al.⁴ Interestingly, the authors found that the detrimental effect of profound endothelial damage on risk of death took place by mechanisms other than causing organ failures per se, which may generate a new lead for therapeutics.

Gando discusses the coagulopathy that is associated with trauma.⁵ After central nervous system damage, hemorrhage is the most frequent cause of death in patients with trauma, and defective coagulation at various stages after trauma seems to play a crucial role. Several new theories on the

mechanism by which trauma influences the coagulation system have been put forward and are discussed in this article. Recently, a special focus on the role of fibrinogen in patients with trauma has been raised, which is illustrated by the contribution of Hayakawa et al.⁶ Fibrinogen levels seem to have a major impact on the outcome in patients with trauma and has been proposed as a therapeutic target in some preliminary studies.

Another group of patients that frequently encounter hemostatic and thromboembolic complications are burn patients. Meizoso et al.⁷ reviewed the available information on pathogenesis and clinical management of coagulation abnormalities in these critically ill patients.

Heparin is commonly used as an anticoagulant in critically ill patients. One of the main adverse effects of heparin, however, is the occurrence of heparin-induced thrombocytopenia (HIT), a clinical syndrome that is dominated by the occurrence of life-threatening venous and arterial thromboembolic complications. Warkentin presents a state-of-the-art overview on the recent insights in diagnosis and treatment of HIT in critically ill patients.⁸ A puzzling phenomenon in patients with critical illness is the occurrence of heparin-resistance. In many cases, alternative anticoagulants have to be used, such as argatroban. Clinical experience with this agent in case of heparin resistance is discussed in this issue as well.⁹ Finally, heparin or heparin variants such as low-molecular-weight heparin are often used as a prophylactic agent for the prevention of venous thromboembolism in patients on the intensive care ward. Boonyawat and Crowther present an overview on the latest evidence of these strategies.¹⁰

In recent years, a renewed interest in point-of-care tests for diagnosis of coagulation derangements in critically ill patients has occurred. In an overview of the potential of these tests in the intensive care environment, the diagnostic accuracy, validation, and clinical utility of these tests is discussed.¹¹

The last three articles in this issue regard hemostasis and thrombosis issues in three frequently occurring clinical

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settings, that is, cardiac surgery, renal insufficiency, and renal replacement treatment, and major liver resection.^{12–14} In these articles, recent insights in pathogenesis and clinical management are highlighted and potentially effective future treatment strategies are proposed.

In conclusion, coagulation abnormalities occur frequently in critically ill patients and may have a major impact on the outcome.¹⁵ An adequate explanation and understanding of the nature of the coagulation abnormality is important, since different underlying disorders may require specific treatment. We hope and expect that this issue of *Seminars in Thrombosis & Hemostasis* will provide an adequate update on these issues in critically ill patients.

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