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CRITICAL CARE MEDICINE BOARD REVIEW MANUAL

Hematologic Disorders in the Intensive Care Unit

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INTRODUCTION

Hematologic emergencies are commonplace in the intensive care unit (ICU). Clinicians in this setting must not only be alert for the possibility of underlying hematologic abnormalities, but also consider how these abnormalities will, in turn, affect the treatments they are prescribing and their potential to create additional morbidities.

Rapid recognition and therapeutic intervention can often be life saving when patients present with hematologic disorders. The purpose of this manuscript is to provide a framework for identifying and treating hematologic emergencies. Three major types of hematologic disorders are considered: thrombocytopenia, neutropenia, and anemia.

THROMBOCYTOPENIA

CLINICAL PRESENTATION

Thrombocytopenia, defined as a platelet count below $150 \times 10^3/mm^3$, results from decreased production or increased destruction of platelets. Thrombocytopenia is considered an emergency when it is associated with bleeding. A patient is at risk of surgical bleeding when the platelet count falls below $50 \times 10^3/mm^3$. Spontaneous bleeding occurs when the platelet count falls below 10 to $20 \times 10^3/mm^3$.

The pattern of bleeding in patients with thrombocytopenia differs from that in patients with coagulation disorders. Patients with coagulation disorders tend to have deeper bleeding into joints, muscle, and tissue, and less petechiae. Thrombocytopenic patients present with mucosal bleeding at various sites, such as epistaxis, gingival bleeding, and large bullous hemorrhages. Skin lesions (eg, petechiae, purpura, ecchymoses) may also occur. Patients with thrombocytopenia tend to bleed immediately and profoundly after trauma. It is rare for the thrombocytopenic patient to present with intracranial hemorrhage. This is fortunate since this is the most common cause of death from thrombocytopenia.

Several nonhematologic disorders can decrease the platelet count and must be distinguished from true thrombocytopenia in the evaluation of the patient with a low platelet count. These include anaphylaxis, hypothermia, eclampsia, dilutional thrombocytopenia resulting from massive transfusions of packed erythrocytes, and "spurious" thrombocytopenia. Dilutional thrombocytopenia occurs in patients with massive blood loss who have received multiple transfusions of packed erythrocytes (ie, 10 to 15 units). The lack of platelets in packed erythrocytes causes the thrombocyte count to decrease. Spurious pseudothrombocytopenia describes a scenario in which platelets clump in a blood sample, and they are falsely counted as leukocytes. Although they are not ICU emergencies, dilutional thrombocytopenia and pseudothrombocytopenia need to be correctly diagnosed. Dilutional thrombocytopenia should be treated with platelet transfusion if bleeding occurs. In all cases of suspected thrombocytopenia, a blood smear should be evaluated to rule out pseudothrombocytopenia.

Thrombocytopenia is not typically a diagnosis that requires admission to the ICU; however, when the platelet count falls to extremely low levels, the risk of serious bleeding is great. Thrombocytopenic processes that are more likely to result in admission to the ICU include idiopathic thrombocytopenic purpura (ITP), thrombotic thrombocytopenic purpura (TTP)/hemolytic uremic syndrome (HUS), the HELLP syndrome, disseminated intravascular coagulation (DIC), and drug-induced thrombocytopenia. Heparin-induced thrombocytopenia (HIT) is the most commonly encountered of the drug-induced thrombocytopenias; other drugs that can cause this adverse reaction include quinidine, valproic acid, piperacillin/tazobactam, trimethoprim/sulfamethoxazole, and interferon.

HEPARIN-INDUCED THROMBOCYTOPENIA

HIT presents in 2 different forms. HIT type I, which mainly results from nonimmune mechanisms, occurs in the first 48 to 72 hours after heparin administration. It is usually associated with a moderate decrease in the platelet count—in most cases, the thrombocyte count does not drop below $20 \times 10^3/mm^3$. Spontaneous bleeding is unusual in HIT type I. HIT type I has no clinical significance and resolves despite continued administration of heparin.