51

Disorders of Hemostasis: Bleeding

Christopher A. Tormey and Henry M. Rinder

INTRODUCTION

The approach to an individual with a bleeding disorder considers whether bleeding has been a lifelong issue (i.e., congenital) or has recently become a problem (i.e., acquired). The approach also considers the underlying pathophysiology, such as defects in the vasculature, platelets, or coagulation factor proteins that predispose the patient to bleeding. This chapter explores clinical concepts and tools that should aid the development of an appropriate framework for evaluating and treating patients with hemostatic defects.

CLINICAL AND LABORATORY EVALUATION OF BLEEDING

The evaluation of bleeding requires a careful history, physical examination, and laboratory evaluation. The patient's history should include a description of bleeding (e.g., epistaxis, menorrhagia, hematoma formation), the circumstances in which bleeding occurs (e.g., trauma, surgery, dental procedures), and whether blood products (and what kind) were required to staunch the bleeding. The temporal addition of medications such as aspirin can be associated with bleeding, as can concomitant medical illnesses such as infection or liver disease. Determining a family history of bleeding is important, and the physician may need to question several generations and second-degree relations (e.g., maternal uncles) if hemophilia is suggested in the proband.

The physical examination may yield some clues as to the origin of bleeding by differentiating small vessel bleeding, such as petechial (pinpoint) hemorrhage, from larger vessel bleeding, which usually produces hematomas and purpura (i.e., large bruises). Small vessel bleeding in the skin, mucous membranes, or gastrointestinal (GI) tract tends to occur more often in patients with thrombocytopenia (i.e., decreased platelet counts), qualitative platelet defects, vascular abnormalities, or von Willebrand disease (vWD). In women, menorrhagia may be the only symptom of a bleeding disorder, and it should never be attributed solely to a gynecologic cause. Large vessel bleeding in organs, joints, deep tissue, or muscles is more commonly associated with factor deficiencies (e.g., hemophilia).

Screening laboratory assays are useful in the initial assessment of the bleeding patient (Table 51-1) and should include blood cell counts (especially the platelet count) and examination of a peripheral blood smear; prothrombin time (PT), which is highly sensitive to defects in vitamin K–dependent coagulation factors (particularly factor VII); and activated partial thromboplastin time (aPTT), which detects deficiencies in factors VIII, IX, and XI (Fig. 51-1). Abnormalities of factors X, V, I (fibrinogen), and II (prothrombin) elevate the PT and aPTT. If the PT or aPTT is prolonged, a mixing study should be performed: The patient's plasma is combined with normal plasma and the clotting time study is repeated. The mixing study distinguishes between factor deficiency (i.e., PT or aPTT corrects to the normal range) and the presence of a circulating inhibitor (i.e., clotting time remains prolonged). Another readily available test for the patient with bleeding is the thrombin time, which assays the functional fibrinogen level. The physiology of the coagulation cascade is explained in Chapter 52.

Platelet function traditionally has been assessed by the in vivo bleeding time, an invasive measure of the time required to halt bleeding in a skin incision (see Chapter 52). The bleeding time is prolonged by qualitative platelet defects and by rare connective tissue disorders. The bleeding time test depends on the expertise of the technician performing the test. Its poor reproducibility and the difficulty of performing the test in infants and neonates have limited its use.

TABLE 51-1 SCREENING ASSAYS FOR HEMOSTASIS

LABORATORY TEST	ASPECT OF HEMOSTASIS TESTED	CAUSES OF ABNORMALITIES
Blood counts and peripheral blood smear	Platelet count and morphologic features	Thrombocytopenia, thrombocytosis, gray platelet and giant platelet syndromes
Prothrombin time	Factor VII–dependent pathways	Vitamin K deficiency and warfarin, liver disease, DIC, factor deficiency (VII, V, X, II), factor inhibitor
Partial thromboplastin time	Factor XI–, IX–, and VIII–dependent pathways	Heparin, DIC, lupus anticoagulant,* vWD, factor deficiency (XI, IX, VIII, V, X, II), factor inhibitor
Thrombin time	Fibrinogen	Heparin, hypofibrinogenemia, dysfibrinogenemia, DIC
Platelet function analysis	Platelet and vWF function	Aspirin, vWD, storage pool disease
Mixing study	Factor inhibitors or deficiencies	Abnormal clotting time corrects for a deficiency; does not correct for an inhibitor

DIC, Disseminated intravascular coagulation; vWD, von Willebrand disease; vWF, von Willebrand factor.

*Lupus anticoagulant is not associated with bleeding.