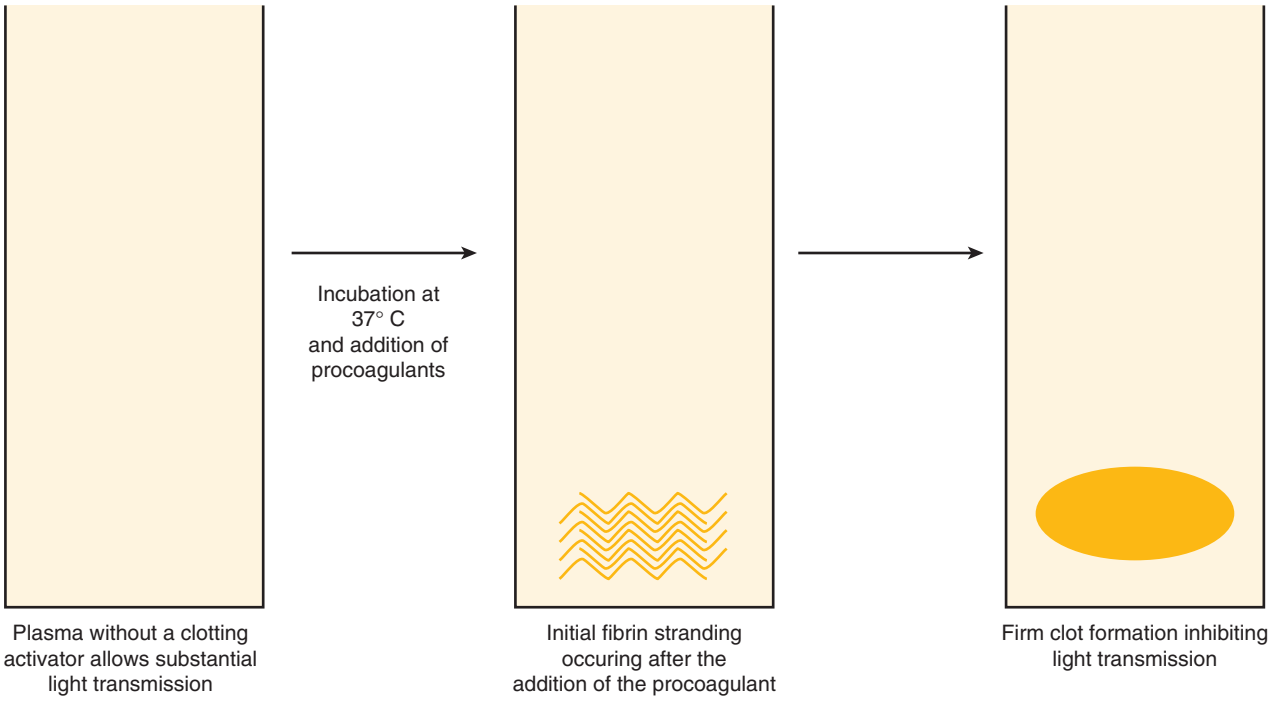

FIGURE 51-1 Basic methodology underlying measurement of prothrombin (PT) and activated partial thromboplastin time (aPTT). **A,** Typical laboratory instrument used to perform basic and complex coagulation assays. **B,** Plasma specimens are incubated at 37° C and then mixed with tissue factor and phospholipid (PT) or a surface activator and phospholipid (aPTT). The time it takes for clot formation to block light passage through the specimen is measured and compared with a reference range. Prolongation of the PT or aPTT clotting time can be associated many congenital or acquired coagulation factor defects. Abnormal PT or aPTT values are typically followed by more specific coagulation factor assays, depending on the type of prolongation and the suspected underlying clinical disease.

Several instruments use phlebotomized whole blood for in vitro assessment of platelet function. One that delivers an in vitro bleeding time is the Platelet Function Analyzer-100 (PFA-100). Citrate-anticoagulated whole blood is passed through a small orifice in a cartridge impregnated with platelet activators such as collagen, adenosine diphosphate (ADP), and epinephrine. As the platelets become activated and adhere, the orifice gradually becomes obstructed, and the time needed for complete occlusion by the platelet plug is measured as the closure time (Fig. 51-2). The closure time is prolonged by qualitative platelet defects such as those caused by aspirin and vWD. Although thrombocytopenia (<100,000 platelets/μL) obviates use of the closure time (similar to the in vivo bleeding time), these in vitro tests are gradually supplanting the measurement of bleeding time.

Another laboratory study for evaluation of a prolonged aPTT, especially in the inpatient setting, is use of the aPTT with an added substance (e.g., hexadimethrine bromide [Polybrene], protamine, heparinase) to neutralize any contaminating heparin resulting from drawing of the blood through an intravenous line. A prolonged aPTT that does not correct in the mixing study may also be observed in patients with a lupus anticoagulant, often in the context of thrombosis. The diagnosis of a lupus anticoagulant can be confirmed by documenting the correction of the aPTT with the addition of excess phospholipid and with other specific tests for lupus anticoagulant (see Antiphospholipid Antibody Syndrome in Chapter 54).

A rapid approach to identifying possible causes of bleeding (Fig. 51-3) considers several major disease categories: (1) vWD,