FIG 24-4 Blood clotting. The extremely complex clotting mechanism can be distilled into three basic steps: (1) release of clotting factors from both injured tissue cells and sticky platelets at the injury site (which form a temporary platelet plug); (2) a series of chemical reactions that eventually result in the formation of thrombin; and (3) formation of fibrin and trapping of red blood cells *(RBCs)* to form a clot. (From Thibodeau GA: *The human body in health and disease,* ed 5, St Louis, 2010, Mosby.)

Subcutaneous and IM hemorrhages are common. Hemarthrosis, which refers to bleeding into a joint cavities, especially the knees, elbows and ankles, is the most frequent form of internal bleeding. Bony changes and crippling deformities occur after repeated bleeding episodes over several years. Early signs of hemarthrosis are a feeling of stiffness, tingling, or achiness in the affected joint, followed by decrease in joint movement. Obvious affected joint signs and symptoms are increased warmth, redness, and swelling and severe pain with loss of movement. Bleeding in the neck, mouth, or thorax is serious because the airway can become obstructed. Intracranial hemorrhage can have fatal consequences and is one of the major causes of death. Hemorrhage anywhere along the GI tract can lead to anemia, and bleeding into the retroperitoneal cavity is especially hazardous because of the large space for blood to accumulate. Hematomas in the spinal cord can cause paralysis.

Diagnostic Evaluation

The diagnosis is usually made from a history of bleeding episodes, evidence of X-linked inheritance (only one third of the cases are new mutations), and laboratory findings. To understand the significance of various tests of hemostasis, it is helpful to recall the usual mechanism to control bleeding (e.g., the function of platelets and clotting factors). The test specific for hemophilia plasma includes factor VIII and factor IX assay, procedures normally performed in specialized laboratories. Other tests are those that depend on specific factors for a reaction to occur, especially the partial thromboplastin time (PTT). Carrier detection is possible in classic hemophilia using deoxyribonucleic acid (DNA) testing and