



FIG 29-3 Salter-Harris fracture classification. Types of epiphyseal injury in order of increasing risk. The injuries are classified as follows: *Type I*, separation or slip of growth plate without fracture of the bone; *type II*, separation of growth plate and breaking off of section of metaphysis; *type III*, fracture of epiphysis extending through joint surface; *type IV*, fracture of growth plate, epiphysis, and metaphysis; and *type V*, crushing injury of epiphysis (can be diagnosed only in retrospect). This classification of epiphyseal injuries was developed by orthopedists RB Salter and WR Harris. (First published in Salter RB, Harris WR: Injuries involving the physeal plate, *J Bone Joint Surg Am* 45[3]:587–622, 1963.)

Immediately after a fracture occurs, the muscles contract and physiologically splint the injured area. This phenomenon accounts for the muscle tightness observed over a fracture site and the deformity that is produced as the muscles pull the bone ends out of alignment. This muscle response must be overcome by traction or complete muscle relaxation (e.g., anesthesia) to realign the distal bone fragment to the proximal bone fragment.

Bone Healing and Remodeling

Bone healing is rapid in growing children because of the thickened periosteum and generous blood supply. When there is a break in the continuity of bone, the osteoblasts are stimulated to maximal activity. New bone cells are formed in immense numbers almost immediately after the injury and, in time, are evidenced by a bulging growth of new bone tissue between the fractured bone fragments. This is followed by deposition of calcium salts to form a **callus**. Remodeling is a process that occurs in the healing of long bone fractures in growing children. The irregularities produced by