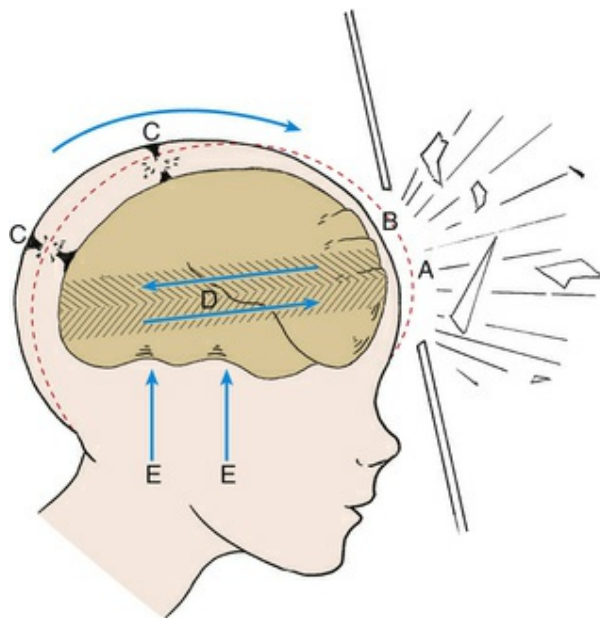


Although the brain volume remains unchanged, significant distortion takes place as the brain changes shape in response to the force of impact to the skull. This deformation can cause bruising at the point of impact (**coup**) or at a distance as the brain collides with the unyielding surfaces far removed from the point of impact (**contrecoup**) (Fig. 27-5). Thus, a blow to the occipital region can cause severe injury to the frontal and temporal areas of the brain. Children with an acceleration/deceleration injury demonstrate diffuse generalized cerebral swelling produced by increased blood volume or a redistribution of cerebral blood volume (cerebral hyperemia) rather than by increased water content (edema).



**FIG 27-5** Mechanical distortion of the cranium during a closed head injury. *A*, Preinjury contour of the skull. *B*, Immediate post-injury contour of the skull. *C*, Torn subdural vessels. *D*, Shearing forces. *E*, Trauma from contact with the floor of the cranium. (Redrawn from Grubb RL, Coxe WS: Central nervous system trauma: cranial. In Eliasson SG, Presky AL, Hardin Jr WB, editors: *Neurological pathophysiology*, New York, 1974, Oxford University Press.)

Another effect of brain movement is shearing stresses, which are caused by unequal movement or different rates of acceleration at various levels of the brain. A shearing force may tear small arteries and cause subdural hemorrhages. Maximum stress from the