

to craniocerebral trauma. For example, infants can be left unattended on beds, in high chairs, and in other places from which they can fall. Because the head of an infant or toddler is proportionately larger and heavier in relation to other body parts, it is the most likely to be injured. Incomplete motor development contributes to falls at young ages, and the natural curiosity and exuberance of children also increase their risk of injury.

Pathophysiology

The pathology of brain injury is directly related to the force of impact. Intracranial contents (brain, blood, CSF) are damaged because the force is too great to be absorbed by the skull and musculoligamentous support of the head. Although nervous tissue is delicate, it usually requires a severe blow to cause significant damage.

Primary head injuries are those that occur at the time of trauma and include skull fracture, contusions, intracranial hematoma, and diffuse injury. Subsequent complications include hypoxic brain damage, increased ICP, infection, and cerebral edema. The predominant feature of a child's brain injury is the amount of diffuse swelling that occurs. Hypoxia and hypercapnia threaten the energy requirements of the brain and increase CBF. The added volume across the blood–brain barrier, along with the loss of autoregulation, exacerbates cerebral edema. Pressure inside the skull that is greater than arterial pressure results in inadequate perfusion.

A child's response to head injury is different from that of an adult. The larger head size and insufficient musculoskeletal support render the very young child particularly vulnerable to head injuries. Physical forces act on the head through acceleration, deceleration, or deformation. Acceleration or deceleration is responsible for most head injuries. When the stationary head receives a blow, the sudden acceleration causes deformation of the skull and mass movement of the brain. Continued movement of the intracranial contents allows the brain to strike parts of the skull (e.g., the sharp edges of the sphenoid or the irregular surface of the anterior fossa) or the edges of the tentorium. Sudden deceleration, such as takes place in a fall, causes the greatest cerebral injury at the point of impact.