Chapter 4

Pediatric trauma

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Head trauma

Pediatric head trauma is the leading cause of death in the pediatric population. The mechanism of injury varies based upon the age of the child: non-accidental trauma falls predominate in the child under two, while motor-vehicle accidents and bicycle injuries predominate in the older child. As one would suppose, the greater biomechanical forces generally produce more significant injuries; the type of force determines the particular type of associated injury.

Computed tomography of the head is a rapid and sensitive test for identifying intracranial injury, but must be used judiciously. Clinical features which may be associated with an increased risk of intracranial injury after blunt head trauma include altered mental status, short term memory loss, vomiting, headache, post-traumatic seizure, clinical evidence of skull fracture, and scalp hematoma in children less than two years of age. Magnetic resonance imaging is more sensitive for both non-hemorrhagic intra-axial lesions and subtle extra-axial hematomas. Advanced MR imaging techniques such as susceptibility-weighted imaging, spectroscopy, diffusion-weighted imaging (DWI) and diffusion tensor imaging may provide further characterization in traumatic brain injury. For example, susceptibility-weighted imaging is useful in detecting small hemorrhagic lesions often associated with diffuse axonal injury (Figure 4.1), while diffusion-weighted imaging is useful in the detection of ischemic injury (Figure 4.2).

Skull fractures

Compared with adults, the calvarium in a child is softer and thinner, and, in children under four, the calvarium is unilaminar and lacks diploe. Children are thus more likely to suffer skull fracture (Figure 4.3) from minor trauma, and children with skull fracture are at increased risk of intracranial injury. Basilar, depressed (Figure 4.4) or stellate fractures require greater impact than simple linear fractures. Scalp hematomas are common with skull fracture.

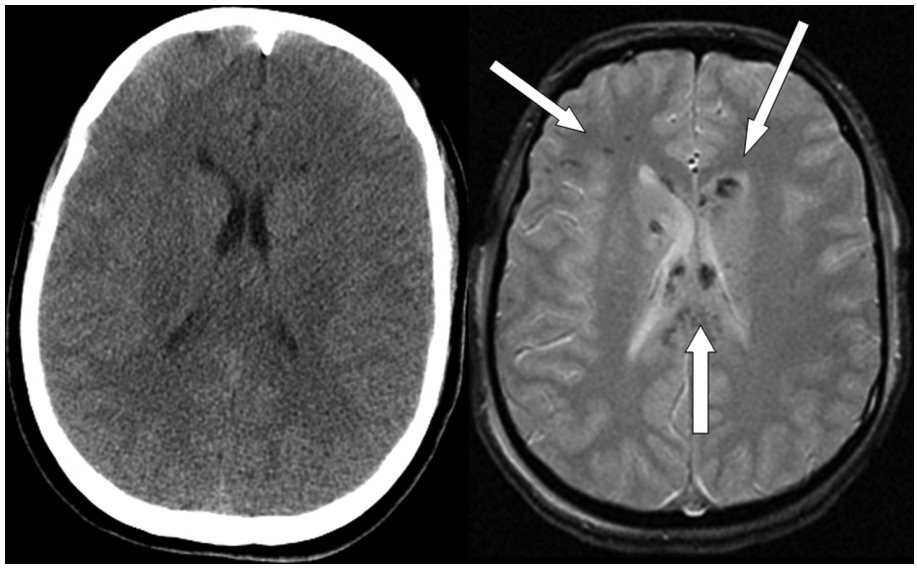

Figure 4.1 Axial CT and GRE (gradient echo) images of a 16-year-old motor-vehicle accident victim. While the CT does not show any abnormality, the GRE shows multiple low-intensity foci (arrows) within punctate parenchymal hemorrhagic axonal injury in the basal ganglia, right frontal white matter and corpus callosum, and left frontal intraventricular hemorrhage.

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