Issues in Pediatric Craniofacial Trauma

Srinivasa R. Chandra, MD, BDS, FDSRCS[a,*], Karen S. Zemplenyi, MD, DDS[b]

KEYWORDS

- Maxillofacial • Craniofacial • Craniomaxillofacial trauma • Pediatric trauma
- Pediatric craniofacial development

KEY POINTS

- The ratio of calvarium to facial skeleton affects incidence and location of craniomaxillofacial trauma in comparing patterns of trauma in children and adults.
- Fixation principles differ in pediatric cases as compared with adults to minimize potential growth restrictions and perturbations.
- The location of permanent tooth follicles must be considered in repair of Maxillomandibular injuries in individuals with primary or mixed dentition.
- Most common pediatric maxillofacial fractures for ages 0 to 18 are mandible (32.7%), nasal bone (30.2%), and maxilla and zygoma (28.6%).
- "Less-is-more" is often the best modus operandi in pediatric trauma treatment.

EPIDEMIOLOGY

In the setting of pediatric maxillofacial trauma, the age group of focus specifically includes children from birth to skeletal maturity (ages 16–18). Death is a common sequelae of trauma in children. However, the incidence of facial trauma is around 15%, far more uncommon than among adults. Pediatric facial fracture types are linked with age-related levels of activity—for example, learning to walk, ride a bike, and contact sports. Child abuse must be considered in cases of multiple facial fractures at various stages of healing with a pattern notable for dentoalveolar injuries and delayed presentation for treatment. With age, there is an overall increase in facial fracture incidence and a decrease in cranial fracture incidence.

The main insults resulting in maxillofacial injury are motor vehicle accidents and falls, making up 50% and 23% of mandibular injuries, respectively, in this age group.[1] The most common pediatric maxillofacial fractures for children ages 0 to 18 years old are mandible (32.7%), nasal bone (30.2%), and maxilla and zygoma (28.6%).[2] Some studies report orbital fractures to be the second most prevalent fracture type; however, nasal fractures are often underreported. Two-thirds of facial injuries occur in boys.[3]

GROWTH AND SURGICAL CONSIDERATIONS

At birth, the cranial vault consists of plates of intramembranous bone with interposed fibrous connective tissue. Embryologically, the midfacial skeleton and cranial vault are derived from intramembranous growth, whereas the skull base and mandibular growth centers derive from endochondral ossification. The intramembranously derived bones heal via fibrous union and subsequent ossification as compared with endochondrally derived

Disclosure Statement: The authors have nothing to disclose.

[a] Oral Maxillofacial–Head and Neck Oncologic Microvascular Reconstructive Surgery, University of Washington, Seattle, WA, USA; [b] Department of Oral Maxillofacial Surgery, University of Washington, Seattle, WA, USA
* Corresponding author. Harborview Medical Center, 325 9th Avenue, Box 359893, Seattle WA 98104.
E-mail addresses: chandra4@uw.edu; ramachandra.srini@gmail.com

Facial Plast Surg Clin N Am 25 (2017) 581–591
http://dx.doi.org/10.1016/j.fsc.2017.06.009
1064-7406/17/© 2017 Elsevier Inc. All rights reserved.

facialplastic.theclinics.com

bones, which ossify through a cartilaginous intermediate. Any trauma or vascular changes to these zones of ossification have the potential to curtail growth. This potential starts as early as birth, at which time any insult or injury to the craniomaxillofacial skeleton might impede or interrupt the multifactorial complex facial bony development. The birthing process itself possesses inherent trauma because the cranial fontanelles must telescope over one another during fetal passage through the vaginal canal. Developmental anatomy in the pediatric patient impacts craniomaxillofacial injury patterns and, as such, the epidemiologic incidence and location of facial fractures varies with skeletal maturity.

Pediatric maxillofacial fractures themselves are relatively rare owing to anatomic differences between the juvenile and adult skulls. First, children's bone is less calcified than that of adults, making fracture less likely than "greenstick" flexing of the bone upon subjection to a force. Second, the facial sinuses are not well-developed until the teenage years (**Fig. 1**, **Table 1**).[3–5] These pneumatized barriers, which would otherwise cushion impact energy to brain, are less developed in children, leading to an increased number of cranial injuries as opposed to shattering of facial bones. Third, the overall ratio of cranial to facial volume decreases with age- 8:1 at birth, 4:1 at 5 years of age, and 2:1 for adults, which further explains why adults would exhibit proportionately more facial trauma as opposed to neurologic injury.[6] Fourth, children have more fat pads around the maxilla and mandible, allowing for increased cushioning of forces leading to reduced fracture rate and enhancing the greenstick fracture effect.[7]

At birth, the mandible has relatively thin cortices with primary tooth buds comprising the majority of the mandibular volume (**Fig. 2**). Cortical bone thickens with growth and the tooth buds occupy relatively less volume with age. The mandibular vectors of growth are controlled by a constellation of interworking factors, including cartilaginous growth centers and soft tissue pull of the surrounding musculature—the "functional matrix."[8] The primary mandibular cartilaginous growth center is in the condyle, which grows in a superior and posterior direction, resulting in an anterior and inferior translation of the mandible with maturity. From birth to 3 years of age, elongation of the mandibular body occurs via labial bony deposition and lingual resorption. With eruption of the primary dentition from 6 months through 3 years of age, and the subsequent establishment of dental occlusion, comes increases in alveolar bone height and width. Notably, the location of the mental foramen in children younger than 3 years old is relatively anterior, presenting in the region between the primary canine and second deciduous molar. The last primary tooth root to form is that of the canine at an average age of 3.25 years (**Table 2**). On average, teeth take 2 to 3 years from crown formation to eruption and root completion.

By the age of 5 to 6 years old, the growth of the mandibular ramus has achieved its maximal rate, increasing the anterior–posterior projection of the mandible, paralleling the growth of the pharynx and maxilla.[9] This lengthening of the arch is

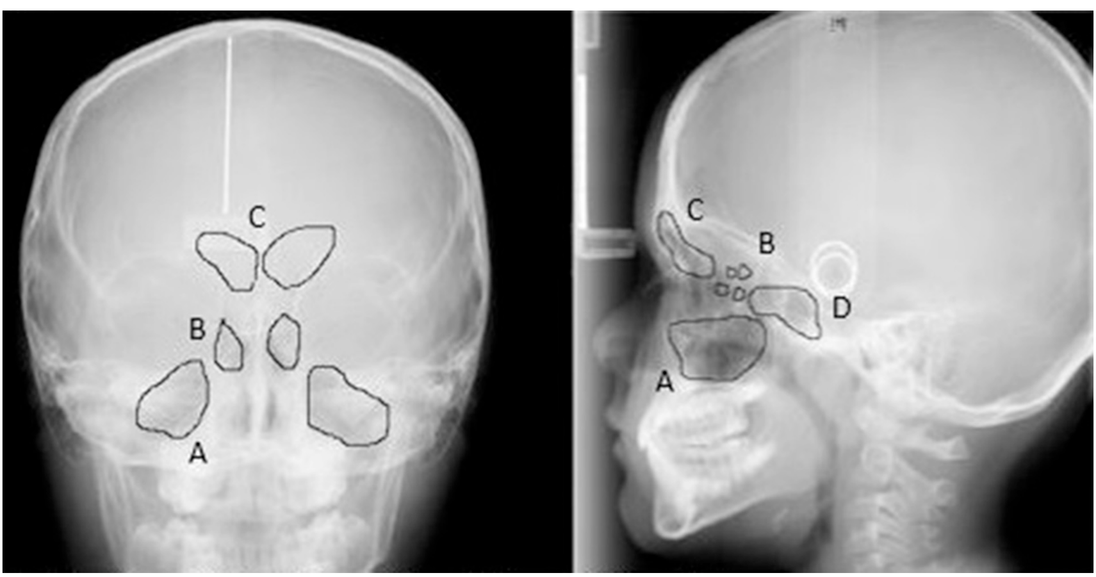

Fig. 1. The sinuses: maxillary sinus (A), ethmoid sinus (B), frontal sinus (C), and sphenoid sinus (D).

Download English Version:

https://daneshyari.com/en/article/5714372

Download Persian Version:

https://daneshyari.com/article/5714372

Daneshyari.com