Pediatric Maxillofacial Trauma: A Review of 156 Patients

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Purpose: To review the epidemiology and management of facial fractures in a pediatric population.

Materials and Methods: This study was a retrospective review of patients younger than 18 years who presented to a pediatric emergency department during a 5-year period in an urban, academic, level 1 designated trauma center.

Results: Of the 156 patients identified, most were boys (87%) and the mean age was 13.5 years (standard deviation, 4.9 yr; interquartile range, 12 to 17 yr). The most common mechanism of injury was assault (48.1%). Mandibular fractures (40.7%) were most common. Multiple fractures occurred in 26.9% of patients. Concomitant injuries occurred in 73.7% of patients, most commonly concussions (39.1%). Intracranial hemorrhages were associated with panfacial (P = .005), frontal (P = .001), and orbital (P = .04) fractures. Most patients (91.7%) were admitted, and nonoperative repair was undertaken in 57.1%. There was an independent association of surgical intervention with age older than 14 years and with mandibular fractures (P < .01).

Conclusions: Assault was the most common mechanism of injury and mandibular fracture was the most commonly encountered. Concomitant nonfacial injuries occurred in most patients. Patients sustaining panfacial, frontal, and orbital fractures should provoke an evaluation for other intracranial injuries. Children older than 14 years and those with mandibular fractures should prompt mobilization of resources for operative repair.

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Injuries in children are very common and 9 million children from birth to 19 years of age are treated every year in emergency departments for unintentional injuries, resulting in a cost of $87 billion.[1] Unintentional injury is ranked as the primary cause of diseases and death in the children at least 1 year old.[1] Facial fractures are relatively uncommon in children and account for 1 to 15% of all facial fractures.[2] The diagnosis of facial fractures in the pediatric population can be challenging. These fractures can be missed at imaging and are often underreported.[3] The conservative management of facial fractures in pediatric patients is often adequate but at other times can be complex and demanding, and the approach to managing facial fractures is distinct in this patient population.[4] The purpose of this article was to review the epidemiology of maxillofacial fractures in an urban level 1 pediatric trauma center and to describe and analyze the mechanisms associated with pediatric maxillofacial injuries, fracture types, associated injuries, and management decisions.

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Materials and Methods

Approval was obtained from the institutional review board of the Albert Einstein College of Medicine (Bronx, NY). This was a retrospective chart review of all patients younger than 18 years who presented to an urban, academic, level 1 designated pediatric trauma center in the Bronx with facial trauma from January 2005 to December 2010. Patients with injuries limited to the soft tissue or fractures limited to the dental, alveolar, and nasal bones were excluded from the study. Eligible subjects were identified by a search using the diagnostic and billing codes for various facial fractures, except for those listed in the exclusion criteria. Patients' names and birthdates were used to obtain the corresponding medical records.

Demographic characteristics of the patient, mechanism of injury, and time from injury to presentation were recorded. The type of facial bone fracture and the presence of any other concomitant injuries were collected. Diagnostic imaging used, consulting craniofacial service subspecialty, and emergency department disposition were recorded. Type of modality used in patients undergoing operative management was recorded.

Frequencies were calculated, and Student *t* test and Mann-Whitney *U* test were used to compare continuous variables. Bivariate analyses were used to identify associations between fracture types and demographic and clinical factors. Variables were chosen that had a *P* value less than .1 in bivariate analysis for multivariate modeling. Evidence of collinearity was evaluated for these variables, and the model was examined for discrimination and overall fit using the area under the curve and the Hosmer-Lemeshow test, respectively.

Results

Of the 156 patients with maxillofacial fractures who were identified, most were boys (136, 87%) and the mean age was 13.5 years (standard deviation, 4.9 yr; interquartile range, 12 to 17). Nine patients (5.8%) presented more than 24 hours after their injury. The most common mechanism of injury was assault (48.1%); the mechanisms are presented in Table 1. There was only 1 case of penetrating trauma with associated fracture from a gunshot wound, with the remaining patients injured by blunt trauma.

Two hundred forty-eight fractures occurred in these 156 patients; 42 patients (26.9%) had multiple facial fractures. The most common fractured bone was the mandible (40.7%), followed by the orbit (33.5%). Fourteen patients (9.0%) sustained multiple orbital fractures and 34 (21.8%) sustained multiple mandibular fractures. The distribution of fracture types and subtypes is presented in Table 2.

Table 1. MECHANISM OF INJURY (N = 156)

Mechanism	n (%)
Assault	75 (48.1)
Pedestrian struck	32 (20.5)
Fall	17 (10.9)
Motor vehicle accident	13 (8.3)
Sports injury	8 (5.1)
Other	11 (7.1)

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Concomitant injuries were diagnosed in 115 patients (73.7%). The most common concomitant injury was concussion, which was diagnosed in 61 patients (39.1%); Table 3 lists all concomitant injuries. Bivariate analysis of these concomitant injuries showed that intracranial hemorrhage was associated with panfacial ($P = .005$), frontal ($P = .001$), and orbital ($P = .04$) fractures. Most patients (91.7%) were admitted, but conservative management with no operative repair was undertaken in 57.1% of cases. Multivariate analysis showed an independent association between the need for surgical intervention and patients older than 14 years (odds ratio [OR] = 5.6; 95% confidence interval [CI], 2.2-14.2) and those sustaining single (OR = 8.0; 95% CI, 3.0-21.8) or multiple (OR = 5.7; 95% CI, 1.3-24.8) mandibular fractures. Further analysis showed no evidence of interaction or collinearity between variables, Hosmer-Lemeshow test resulted in no evidence of poor fit ($P = .49$), and an area under the curve for the model showed excellent discrimination (0.87; 95% CI, 0.80-0.93).

Table 2. FRACTURE TYPES AND SUBTYPES (N = 248)

Fractured Bone	Patients, n (%)
Mandible	101 (40.7)
Angle	38 (37.7)
Parasymphysis	27 (26.8)
Body	12 (11.9)
Condyle	8 (7.9)
Subcondylar	8 (7.9)
Ramus	4 (3.9)
Mandibular alveolus	3 (3.0)
Symphysis	1 (0.9)
Orbit	83 (33.5)
Orbital wall	43 (51.8)
Orbital floor	38 (45.8)
Naso-orbital-ethmoid	2 (2.4)
Maxilla	29 (11.7)
Frontal	26 (10.5)
Zygomatic arch	9 (3.6)

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