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Pediatric Mandible Fractures at a Level 1 Trauma Center: A 10-year Retrospective Study

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Abstract

Objectives: Mandible fractures seen in pediatric populations are relatively uncommon events when compared to adults. However, mandibular fractures remain the most common facial fracture occurring pediatric patients. In an attempt to better evaluate and categorize the incidence of mandible fractures seen in pediatric patients, this study takes a look at data pertaining to mandible fractures seen at a level 1 pediatric hospital over a 10-year period.

Materials and Methods: This retrospective study includes data from 315 pediatric patients under 18 years of age seen for mandible fractures at a level 1 trauma center seen between 2005-2014. Data from 545 mandibular fracture sites was obtained and analyzed from chart review. The data set was then used to evaluate and contrast fractures in this population with data found in previous literature.

Results: 545 fractures were identified in 315 patients during the 10 year time span. Data from hospital records was recorded and epidemiological data was delineated and analyzed. In attempt to provide further correlation with age and fracture incidence, data was split into 3 broad age ranges: ages 0-4 (14%), ages 5-12 (31%), and ages 13-17 (55%). Fracture incidence based on gender rendered a female to male ratio of 1:4. Analysis of mechanism of injury/etiology showed assault as most common culprit (33.3%), followed by motor vehicle accident (29.5%), fall (25.2%), sporting injury (5.1%), miscellaneous (4.4%), and unknown mechanism (1.1%).

Conclusions: As theorized, incidence of mandible fractures increase with increasing age and are more common in male gender. Furthermore, in this population, data yielded etiology in the form of assault as the most common and was highly correlated with increasing age. In this urban based study, male to female predilection as well as the etiology of assault was slightly higher in comparison to other literature.

Keywords: Mandible fractures; Pediatrics; Trauma

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Introduction

Facial fractures seen in the pediatric patient are a relatively rare event when compared to adult facial fractures [1], although children are more susceptible to facial trauma due to large cranial mass to body ratio [2]. This ratio of low incidence of facial fracture to high susceptibility to facial trauma can be attributed to the flexibility of facial bones, relative retrognathism, prominent buccal fat pads, and lack of pneumatization of paranasal sinuses when compared to adult populations [3]. Despite the relative retrognathism associated with childhood, it has been shown that mandible fractures are the most commonly seen facial fracture in the pediatric population [4-6]. It was determined that the focus of this study would be solely based on mandible fractures for a few reasons. Because of the increased incidence of mandible fractures compared to other facial fractures, the numerical number of injuries would be large enough to study. The analysis and categorization of fractures are simplified due to well documented fracture sites of the mandible. Also, collecting and evaluating data is made possible and due to the single bone nature of the mandible versus the propensity multiple-bone fractures seen in the midface. The aim of this study is to take a retrospective glance at a pediatric level 1 trauma center located in an urban setting in attempt to analyze epidemiological data regarding mandible fractures. Furthermore, this study plans to compare and contrast data obtained in this population of pediatric mandible fractures with values obtained from existing data.

Materials and Methods

Due to the retrospective nature of this study, it was granted an exemption in writing by the University of Tennessee Health Science Center IRB. Data was sourced from ICD-9 coding for mandible fractures from LeBonheur Children's Hospital in Memphis, Tennessee; a level 1 trauma center. The period of interest spanned a 10-year duration from January 1, 2005 to December 31, 2014. Using the retrieved data from the ICD-9 coding source, final determination of inclusion or exclusion into this study was determined by chart review. Data collected was inclusive for patients under the age of 18 that had mandible fractures with a definite fracture site(s). All other facial trauma that was included in the original data (midface fractures, dentoalveolar fractures, dental trauma, facial lacerations, etc.) were identified and excluded. If a patient had a mandible fracture in addition to other facial fractures, the mandible fracture(s) was the only information included. Other exclusion criteria included insufficient data regarding definite mandible fracture, duplicate charting, and incorrect coding. Information gained from those fractures that met inclusion criteria included multiple aspects for analysis. The records of these patients were studied for fracture type (condylar, subcondylar, ramus/coronoid, angle, body, parasymphysis, and symphysis), fracture number, patient age, gender, etiology, and treatment modality per patient (if available). Data regarding treatment type was recorded if available in the record, however treatment type was recorded on a per patient basis only and not per fracture site due to insufficient data from chart review. If no treatment was received or there was not enough detail regarding treatment for a definite determination, it was recorded under no treatment/conservative management/referral/unknown. With the inclusion and exclusion parameters in place, the final information collected from original data was analyzed to identify epidemiological information regarding mandible fractures seen in this level 1 trauma center. The data was then used for comparison to existing literature.

Results

During this 10-year period, data from 393 pediatric patients was reviewed. Of these 393 patients, 78 were excluded due to failure to meet inclusion criteria for the study. This left 315 patients that met inclusion criteria and from which useful data was recorded and utilized. In total, 545 fractures involving the mandible were identified from this population of 315 patients. From the data set, 132 (41.9%) patients had single fracture sites, 142 (45.1%) patients had 2 fracture sites, 35 (11.1%) patients had 3 sites, and 6 (1.9%) had 4 fracture sites. To better distinguish and simplify the correlation of incidence with age, 3 broad age range groupings were created. Groupings of age ranges were distributed as follows: ages 0-4, 5-12, and 13-17. The age group that contained the largest proportion of patients was the 13-17 age group with 55% of fractures, followed by the 5-12 group with 31%, then 0-4 group with 14%.The incidence in relation to age groups shows a higher proportion of fractures occurring with increasing age (Figure 1). Data analysis shows a mean age of mandible fracture at 11.17 years of age, median age 13, and mode 15 years of age. The etiology of trauma recorded from patient chart data showed assault (33.3%) was most common mechanism of injury followed by motor vehicle accident (29.5%), fall (25.2%), sporting injury (5.1%), miscellaneous (4.4%), and unknown mechanism (1.1%) (Table 1). By distributing the data into age ranges, it is evident that as incidence overall increases with age, so does the incidence and proportion of assault as the etiology increase. Gender distribution of fracture

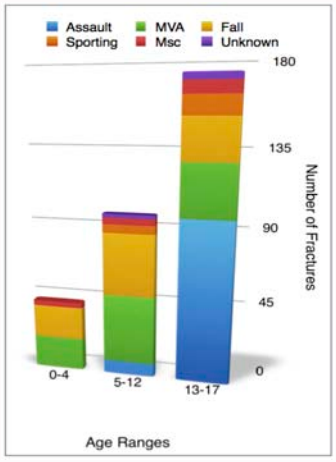

Figure 1:

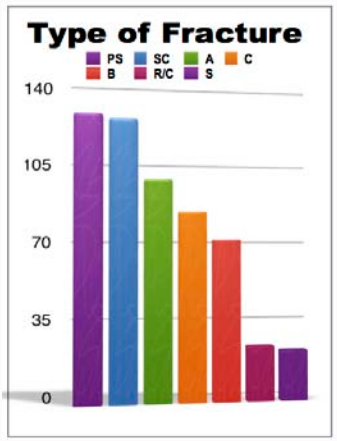

Figure 2:

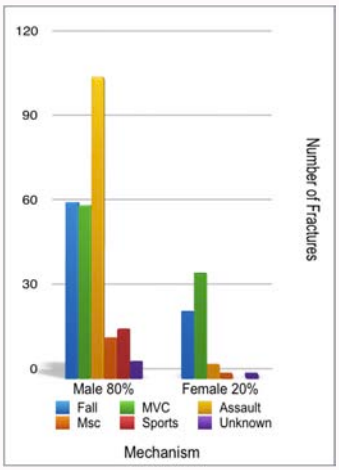

Figure 3:

number and etiology of fracture shows a male to female predilection of 4:1, with assault as the overall most common mechanism of injury in males while MVA was most common overall in females (Figure 3) (Table 3). The type/location of mandible fracture was recorded and analysis showed parasymphysis fractures as being the most common at 22.94% followed closely by subcondylar fractures (22.57%), then

Table 1:

Mechanism	0-4	5-12	13-17	Total
Assault	0	8	97	105
MVA	20	42	31	93
Fall	20	37	24	81
Sporting	0	5	11	16
Msc	3	4	7	14
Unknown	0	2	4	6
Total	43	98	174	315

Table 2:

Type	Number	Percentage
Parasymphysis	125	22.94%
Subcondylar	123	22.57%
Angle	97	17.80%
Condylar	83	15.23%
Body	71	13.03%
Ramus/Coronoid	24	4.40%
Symphysis	22	4.00%
Total	545	

Table 3:

Mechanism	Male	Female
Fall	59	22
MVC	58	35
Assault	101	4
Msc	13	1
Sports	16	0
Unknown	5	1
Total	252	63
Percentage	80%	20%

angle (17.8%), condylar head (15.23%), body (13.03%), ramus/coronoid (4.40%), and least commonly, the symphysis (4.04%) (Figure 2) (Table 2). Fracture side was also recorded and analyzed with left-sided mandible fractures accounting for 268 of the total fractures, right-sided fractures 255, and 22 symphysis fractures. If available, treatment performed for each patient with a fracture was recorded and grouped into categories of: no treatment/conservative management/referral/unknown, closed reduction with maxillomandibular fixation, open reduction internal fixation and closed reduction with maxillomandibular fixation, and open reduction internal fixation. Because of available data, treatment category was not recorded for each individual fracture but was recorded as type of treatment per patient. Data showed 102 patients (32.4%) were treated with only CRMMF, 5 treated (1.6%) with ORIF, 106 patients (33.6%) treated with ORIF/CRMMF, and 102 fracture patients (32.4%) with no treatment/conservative management/referral/unknown treatment.

Discussion

Analysis of the data from this study yields similar result to those seen in previous literature. Age and gender-related discrepancies in fracture incidence share similarities with other studies. As the patient population increases in age, the incidence of mandible fracture increases just as the proportion of etiology changes to an increase in number of assaults, which has been previously demonstrated [5,7]. Gender-related differences in relation to fracture number have a 4:1 male to female predilection from this data set, which is slightly higher than the 2:1 in male to female ratio seen in other examples [4,6,8,10]. In this study, assault was the most common etiology of fracture, and was highly correlated with increasing age in male patients. This correlation between age and etiology is not an uncommon occurrence in facial fracture etiology [1,5,7,9], especially when the setting of an urban environment is taken into account. Of course, this can be contrasted with other age groupings and demographics where the most common etiology is a fall [4]. Data regarding fracture site also mirrored previous studies, with the parasymphysis being the most common fracture site followed closely by subcondylar fractures (8). Treatment modalities in this data set cannot be necessarily linked to fracture type as many of those in this patient population had multiple fracture sites of the mandible. Rather, treatment rendered should be viewed on a per patient basis only. In addition to this, information falling under the category of no treatment/referral can be misleading because treatment proposed and rendered on an outpatient or referral basis could not be recorded in the data set due to insufficient data from patient records. A small degree of error can also be accounted for in the inclusion and exclusion criteria used to obtain useful information. From the original data set, 78 records were not used in this study. A small number of these records were excluded because of insufficient data in regards to a definite mandible fracture. If these records had been complete with all inclusion criteria, results may have been affected somewhat. Other exclusion criteria included data resulting from coding mistakes such as midface fractures, dentoalveolar fractures, dental trauma, or facial lacerations, as well as charting redundancies, etc.

Conclusion

The demographics of mandible fractures in a pediatric population shown in this study are coincident with data previously seen in pediatric populations. Etiology, gender differences, and changes in incidence across ages are the most notable distinguishing factors in this unique data series featuring a pediatric hospital in an urban setting. The differences shown across age and gender are reflected in the etiology of fractures that can be attributed to social change and growth of a pediatric population. To better understand the clinical significance of mandible fractures in a pediatric setting, future studies are necessary. Further evaluation of treatment modalities on a per fracture basis as well as review of outcomes would prove to be an invaluable source of knowledge for future treatment of pediatric mandible fractures.

References

1. Gassner R, Tuli T, Hächl O, Moreira R, Ulmer H. Craniomaxillofacial trauma in children: a review of 3,385 cases with 6,060 injuries in 10 years. Journal of Oral and Maxillofacial Surgery. 2004; 62: 399-407.

2. Wymann NE, Hölzle A, Zachariou Z, Iizuka T. Pediatric Craniofacial Trauma, Journal of Oral and Maxillofacial Surgery. 2008; 66: 58-64.

3. AJ Holland, C Broome, A Steinberg, et al. Facial fractures in children. Pediatric Emergency Care. 2001; 17: 157-160.

4. HV Kambalimath, SM Agarwal, Deepashri H Kambalimath, Mamta Singh, Neha Jain, et al. Maxillofacial Injuries in Children: A 10 year Retrospective Study. J Maxillofac Oral Surg. 2013; 12: 140–144.

5. Hoppe IC, Kordahi AM, Paik AM, Lee ES, Granick MS. Age and sex-related differences in 431 pediatric facial fractures at a level 1 trauma center. J Craniomaxillofac Surg. 2014; 42: 1408-1411.

6. Boffano P, Roccia F, et al. European Maxillofacial Trauma (EURMAT) in children: A multicenter and prospective study. Oral Surgery, Oral Medicine, Oral Pathology and Oral Radiology. 2015; 119: 499-504.

7. Grunwaldt L, Smith DM, Zuckerbraun NS, et al. Pediatric facial fractures: demographics, injury patterns, and associated injuries in 772 consecutive patients. Plast Reconstr Surg. 2011; 128: 1263-1271.

8. Smith D, Bykowski M, et. al. 215 mandible fractures in 120 children: demographics, treatment, outcomes, and early growth data. Plast Reconstr Surg. 2013; 131: 1348-1358.

9. Kim S, Lee S, and Cho P, et al. Analysis of 809 Facial Bone Fractures in a Pediatric and Adolescent Population. Arch Plast Surg. 2012; 39: 606-611.

10. Iatrou I, Theologie-Lygidakis N, Tzerbos F. Surgical protocols and outcome for the treatment of maxillofacial fractures in children: 9 years' experience. J Craniomaxillofac Surg. 2010; 38: 511-516.

11. Vyas R, Dickinson B, Wasson L, Roostaeian J, Bradley P. Pediatric facial fractures: current national incidence, distribution, and health care resource use. J Craniofac Surg. 2008; 19: 339-349.