

Patterns of pediatric facial fractures: A five year retrospective study

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Abstract

Aim: The aim of this study was to analyze the patterns of facial fractures in children under 12 years of age admitted at oral and maxillofacial surgery department in Asser central hospital, Abha, Kingdom of Saudi Arabia in a period of 5 years between July 2011 and June 2016.

Material and Methods: This retrospective study involved all pediatric patients under 12 years admitted at the department of oral and maxillofacial surgery of Asser central hospital with facial fractures. The following parameters were evaluated: age, gender distribution, etiology of trauma, type of fractures, and treatment modality. Data was analysed using SPSS.

Results: Out of 94 children with facial bone fractures, the majority were aged between 6-12 years (72%, (n=68)). The mean (\pm SD) age was 8.4 \pm 3.4 years and male to female ratio was 3.7:1. Road traffic accident (RTA) was the most frequent mode of injury (48.9%, n=46). The mandible was most commonly involved (53.2%, n=50) and dentoalveolar fractures including maxilla and mandible encountered 36.2% (n=34) of the cases. The majority of cases (89.4%, n=84) had surgical treatment.

Conclusion: The incidence of pediatric facial fractures in Asser region was high. The 6-12 year olds and boys were most commonly involved in maxillofacial pediatric trauma. The most common etiological factor was the RTA. Mandibular fractures were the most common type of fracture. Safety programs should be instituted in Aseer region to increase public awareness and to decrease morbidity resulting from pediatric trauma.

Keywords: Pediatric, Maxillofacial, Trauma.

Introduction

Head injuries of children are common, comprising more than half of all injuries sustained. The mortality and morbidity rates associated with traumatic head injury in children are high and the majority of deaths due to trauma in children are caused by brain injury.⁽¹⁾ Trauma is a leading cause of injury and death among the pediatric population. There is a pattern of facial fractures by age that is influenced by trends in the mechanism of injury and facial development. Cranial and central facial injuries are more common in toddlers and infants and mandibular fractures are more common in adolescents and beyond. A large proportion of facial fractures were caused by RTA.⁽²⁾ The exponential rise in the incidence of facial fractures associated with skull fractures in children reflect the growth and development of the face to downward and forward direction that make it more susceptible to trauma. The lower Glasgow Coma Scale (GCS) in children sustaining facial fractures suggests that a higher energy injury may be required for the craniofacial fractures in the pediatric population. Pediatric facial fractures account for 5 to 15% of all maxillofacial injuries.⁽³⁾ The lower facial fractures are usually not associated with cranial bone fractures.⁽⁴⁾

The most prevalent cause of pediatric facial fractures are accidental falls (58.2%) including falling on the floor when playing, falling from bed and stairs, and falling from height, followed by violence (12.7%), bicycle (10%), and motor vehicle accidents (8.2%). Sports injuries represented only 7.3% and others 3.6%.^(5,6) Nasal fractures were the most common

(69.1%) and condyle was the most common site of mandibular fractures (63.2%). The mandible was the most common bone to fracture (65%) and the body of the mandible was the commonest site to be involved by fracture (27%). Only 10% of cases involved both jaws.⁽¹⁶⁾ The zygomatic bone appeared to be the most common bone involved in mid-face fractures (45%).⁽⁷⁾

Road traffic accidents (RTAs) are a major health hazard in Kingdom of Saudi Arabia (KSA). The ensuing trauma has increased in direct proportion to the increase in the number of road vehicles. An audit of RTAs over a one year period revealed that, out of 361 victims, 16% were less than 10 years and 47% between 11 and 30 years. Half of the children injured were pedestrians. There was a male to female ratio of 4:1 reflecting the driving laws in KSA.⁽⁸⁾ The most common pattern of pediatric injuries in Riyadh city, KSA are fall (40.4%) and RTAs (15%).⁽⁹⁾ Reckless driving, failure to follow traffic rules, driving by unlicensed teenager and elderly individuals contribute the high incidence of RTAs in Aseer region.⁽¹⁰⁾ Accurate and prompt diagnosis is critical in the optimal management of pediatric facial fractures.⁽¹¹⁾ Patient with facial bone fracture should be referred immediately to oral maxillofacial surgeon for appropriate management of pediatric maxillofacial fractures.⁽¹²⁾ Maintenance of normal fluid and electrolyte balance is critical in children.⁽¹³⁾

The minimally displaced mandibular fracture is usually managed by a short course of maxilla-mandibular fixation (MMF) usually 1 to 2 weeks using elastics.⁽¹⁴⁾ The use of open reduction and rigid internal

fixation without maxillomandibular fixation also has obvious advantages for the management of children with multiple injuries.⁽¹³⁾ The aim of this study was to analyze the patterns of facial fractures in children up to twelve years of age admitted at oral and maxillofacial surgery department in Aseer central hospital, Abha city, KSA retrospectively in the last five years.

Material and Methods

All pediatric patients under 12 years admitted at the department of oral and maxillofacial Surgery of Aseer central hospital diagnosed with facial fracture were included in this study. The study was a five years retrospective study from July 2011-June 2016. The data collected from the patients records included, age, gender, etiology, type of injuries, and treatment modalities.

Inclusion criteria:

1- All pediatric patients under 12 years admitted to OMFS department with facial bone fractures.

Exclusion criteria:

1- Fractures involving the skull vault or frontal bone were not included in the study because children with cranial bone fracture are usually referred and managed by neurosurgery according to the hospital policy.

2- Soft tissue injuries were not included in the study as they are mainly treated at emergency departments without recording.

3- Patients with dental trauma also were not included in the study as they were either managed at emergency departments without recording or referred to pedodontist at dental center.

4- Isolated nasal fractures as these are managed by the ENT team in their OPD clinic.

The study was conducted at the department of oral and maxillofacial surgery at Aseer central hospital following the approval from research center of Riyadh colleges of dentistry and pharmacy and hospital ethical committee. Statistical analysis was performed using Statistical Package for Social Sciences (IBM SPSS), Version 22 for Windows.

Results

The incidence of pediatric facial fractures in relation to age group is shown in Table 1. Out of 94 children with facial bone fractures, 72% (n=68) were 6-12 years (school age) old and 28% (n=26) were under 6 years (pre-school) of age. It can be seen that children in the 6-12 years age group were more commonly involved with a peak incidence at 12 years. The mean age was 8.4 ± 3.4 (SD) years, ranging from 2-12 years. Gender distribution showed that 79% (n=74) were males and 21% (n=20) were females with a male to female ratio of 3.7:1 (Table 1).

Table 1: Distribution of pediatric facial fracture by age and gender

		Frequency	Percent
Age	< 6 years	26	28
	6-12 years	68	72
Gender	Male	74	79
	Female	20	21

Table 2: Distribution of pediatric facial fracture by mode of injury

	Frequency	Percent
RTA	46	48.9
Fall	30	31.9
Sport	10	10.6
Bicycle accident	8	8.5

Table 3: Pattern of pediatric facial fractures

Site of fracture	Responses		Percent of cases
	Frequency (n)	Percent (%)	
Mandible	50	41.0%	53.2%
Dentoalveolar	34	27.9%	36.2%
Maxilla	12	9.8%	12.8%
Nasal	12	9.8%	12.8%
Zygoma	10	8.2%	10.6%
Orbital	4	3.3%	4.3%
Total	122	100.0%	129.8%

RTAs were the most frequent mode of injury (48.9%, n=46), followed by fall (31.9 %, n=30), sport (10.6%, n=10), and bicycle accident (8.5%, n=8) (Table 2). Table 3 shows that the mandible was most commonly

involved (53.2%, n=50), followed by dentoalveolar fractures 36.2% (n=34), maxilla (12.8%, n=12), nasal (12.8%, n=12), zygoma (10.6%, n=10), and orbital (4.3%, n=4) fractures, respectively. The majority of

cases (89.4%, n=84) had surgical treatment and 21.3% (n=20) of cases had conservative treatment. Among the

surgical treatment, 42.6% (n=40) of cases had CRIF and 46.8% (n=44) had ORIF (Table 4).

Table 4: Treatment type among pediatric facial fractures

Treatment		Responses		Percent of cases
		Frequency (n)	Percent (%)	
Surgical	CRIF	40	38.5%	42.6%
	ORIF	44	42.3%	46.8%
Conservative		20	19.2%	21.3%
Total		104	100.0%	110.6%

Table 5: Site of pediatric facial fractures by age group

Site of fracture	Age group		Total
	Under 6 year's n (%)	6-12 years n (%)	
Mandible	12 (24.0)	38 (76.0)	50
Dentoalveolar	16 (47.1)	18 (52.9)	34
Maxilla	2 (16.7)	10 (83.3)	12
Nasal	2 (16.7)	10 (83.3)	12
Zygoma	2 (20.0)	8 (80.0)	10
Orbital	2 (50.0)	2 (50.0)	4
Total	26	68	94

Table 6: Type of pediatric facial fractures by gender

Site of fracture	Gender		Total
	Male n (%)	Female n (%)	
Mandible	44 (88.8)	6 (12.0)	50
Dentoalveolar	20 (58.8)	14 (41.2)	34
Maxilla	12 (100.0)	0 (0.0)	12
Nasal	10 (83.3)	2 (16.7)	12
Zygoma	10 (100.0)	0 (0.0)	10
Orbital	4 (100.0)	0 (0.0)	4
Total	74	20	94

Table 7: Site of pediatric facial fractures by mode of injury

Site of fracture	Mode of injury				Total
	Fall n (%)	RTA n (%)	Bicycle accident n (%)	Sport n (%)	
Mandible	12 (24.0)	28 (56.0)	8 (16.0)	2 (4.0)	50
Dentoalveolar	20 (58.8)	8 (23.5)	0 (0.0)	6 (17.6)	34
Maxilla	0 (0.0)	12 (100.0)	0 (0.0)	0 (0.0)	12
Nasal	0 (0.0)	10 (83.3)	2 (16.7)	0 (0.0)	12
Zygoma	0 (0.0)	8 (80.0)	0 (0.0)	2 (20.0)	10
Orbital	0 (0.0)	4 (100.0)	0 (0.0)	0 (0.0)	4
Total	30	46	8	10	94

Table 8: Treatment for type of pediatric facial fractures

Site of fracture	Treatment			Total
	Surgical		Conservative n(%)	
	CRIF n (%)	ORIF n (%)		
Mandible	20 (40.0)	36 (72.0)	0 (0.0)	50
Dentoalveolar	14 (41.2)	6 (17.6)	18 (52.9)	34
Maxilla	6 (50.0)	8 (66.7)	0 (0.0)	12
Nasal	12 (100.0)	4 (33.3)	0 (0.0)	12
Zygoma	6 (60.0)	4 (40.0)	2 (20.0)	10
Orbital	4 (100.0)	2 (50.0)	0 (0.0)	4
Total	40	44	20	94

Table 5 shows the site of facial fractures by age group. Cross-tabulation showed 6-12 years age group was more likely to have facial fractures in all sites. Association between gender and site of facial fracture by cross-tabulation showed male were more likely to have facial fractures in all sites than female (Table 6). (Table 7) shows the association between site of pediatric facial fractures and mode of injury. All sites of fracture except dentoalveolar were more likely to be due to RTA. Dentoalveolar fracture was more likely to be due to fall. CRIF was done mainly for those with nasal and orbital fracture, ORIF in mandible and maxilla fracture, and conservative treatment for dentoalveolar fracture (Table 8).

Discussion

The present study showed 94 children with facial bone fractures less than 12 years old in period of 5 year. Another study was done in same hospital for all patient with facial fracture reported 101 cases with facial fractures during a period of 1 year (10). Thorén et al. (2009) reported a total of 191 children diagnosed with facial fractures during 10 years in Finland which is compatible with present study (15). A study in Brazil that reported 110 children with facial fractures under 12 years old during 3 years which is almost double the incidence of children in the present study.⁽¹⁶⁾ Another study in Malaysia reported 113 cases diagnosed with facial fractures from 23 governmental hospital for patients less than 15 years old.⁽⁷⁾

In the present study, the patient mean age of 8.4 ± 3.4 years was lower in comparison with other studies.^(7,10,15) The current study showed that males were more susceptible to facial trauma than females. More frequently young children sustain injuries from low-velocity forces than older children who are more likely to be exposed to high velocity forces.⁽¹⁶⁾ In the present study, RTAs were the most prevalent etiological factor of facial fractures. This is in agreement with Shanks et al. (1994) who stated that RTAs are a major health hazard in KSA. This has also been reported by Posnick et al. (1993), Holland et al. (2001), and Ferreira et al. (2005).^(17,19) The second most frequent etiological factor was the falls and the present study is in agreement with the reports by Lee (2009).⁽⁵⁾

The mandible was the most common site (53.2%) which is in agreement with the majority of studies which have reported the mandible as being the most common bone involved in pediatric facial fractures.^(17,19,20) The nasal bone fractures in this study differ from the majority of studies which have reported that the nasal bone was the most common pediatric facial fractures.^(21,22) This may be due to undiagnosed nasal fracture, particularly if they were undisplaced or most of the cases referred immediately to the ENT department.

Eighty percent of patients were treated surgically and about 19% were treated conservatively. In the

literature, conservative treatment of facial fractures ranged from 82% reported by Wymann et al. (2008)⁽²³⁾ and 21% reported by Ferreira et al (2004).⁽²⁴⁾ In the present study, it was recommended to treat the patient surgically followed by removing the plate after the healing time of fractures to avoid any possible interference with facial growth in children and this was in agreement with Iatrou et al. (2010).⁽²⁵⁾ For most of non-displaced mandibular fracture especially the condylar fractures it was recommended to do the closed reduction internal fixation based on occlusion restoration with or without MMF followed by physiotherapy.

Conclusions

The five years incidence of pediatric facial fractures in Aseer region was higher in 6-12 year olds and boys were more commonly involved in maxillofacial pediatric trauma. The most common etiological factor was RTAs. Mandibular fractures were the leading type of fracture. This data serve as a warning to maxillofacial surgeons to provide the proper and early management to prevent farther facial asymmetry or occlusion disturbances. It is also recommend that researchers should conduct future studies analyzing the post-operative deformity for the managed children in the same hospital.

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