Indian J Surg (May–June 2010) 72:232–235
DOI: 10.1007/s12262-010-0056-x

ORIGINAL ARTICLE

Trauma of facial skeleton in children: An indian perspective

Tanweer Karim · Arshad Hafeez Khan · Syed Saeed Ahmed

Received: 9 November 2009 / Accepted: 10 February 2010

Abstract

Aims Both children and adults are subject to similar types of injuries but fractures of facial bones in children are relatively uncommon. The aim of this study was to evaluate the epidemiology of facial bone fractures among children of <12 years, their management and outcome in an Indian city.

Material and methods This retrospective study included children of <12 years of age with facial bone fractures admitted over a span of 3 years. In order to compare our results we reviewed the existing literature related to pediatric facial bone fractures.

Results A total of 45 children were admitted for facial bone fractures. Forty (89%) of them were above 5 years of age and male to female ratio was 2:1. About 53.33% of these injuries were because of fall from height. Mandible fracture was the most common facial bone fracture among admitted patients. Symphysis and para-symphysis was the commonest site of mandibular fractures, seen in 49% cases. Majority of these fractures were managed by Inter-maxillary fixation and inter-osseous wiring. Mini-plates were used for widely displaced compound fractures. For un-displaced fractures observation alone was sufficient.

Conclusion Mandible is the commonest facial bone fracture in children, more often caused by accidental fall from height. The high osteogenic potential of pediatric mandible allows non-surgical management to be successful in an increased proportion of younger patients.

Keywords Pediatric facial trauma · Inter-maxillary fixation · Fracture fixation methods

Introduction

Maxillofacial injuries are among the most frequent injuries seen in the emergency department. This carries a special significance because of conspicuous location of the human face, its aesthetic importance and psychological image of self. Facial trauma may also adversely affect important functions such as speech, mastication, respiration and deglutition. Both children and adults are subject to similar types of injuries but fractures of facial bones in children are relatively uncommon in comparison to fracture of other bones in the body and in comparison to incidence of such injuries in adults. The common etiologies are road traffic accidents, fall from height, sports and physical abuse [1– 4].

Diagnosis is based on clinical examination, X-ray of temporomandibular joint (open and closed mouth position), mandible (posteroanterior view in open mouth position) and face (right and left lateral oblique view), orthopantogram (OPG) and computerized tomography (CT) scan [5, 6]. The objective of trauma management in children are management of soft tissues, management of bone trauma

T. Karim[1] · A. H. Khan[2] · S. S. Ahmed[3]
[1]Department of Surgery, MGM'S Medical College, Navi Mumbai, India
[2]Department of Plastic Surgery, JN Medical College, Aligarh Muslim Universiry, Aligarh, India
[3]Department of Maxillofacial Surgery, Dental College, Aligarh Muslim University, Aligarh, India

T. Karim (✉)
E-mail: karimtanweer@yahoo.co.in

and a combination of two besides emergency care of life threatening injuries [7].

There is paucity of Indian literature related to pediatric facial bone fractures. The aim of this study was to evaluate the epidemiology of facial bone fractures among children of <12 years, their management and outcome in an Indian city.

Materials and methods

This retrospective study included 45 children of <12 years, with facial bone fractures. All of them were admitted over a span of 3 years, from January 2000 to December 2002. Those with isolated soft tissue injuries were excluded from study because many of them had only minor injuries. They were treated in out patient department (OPD) and had poor follow-up. In such cases details of soft tissue injuries were not available. Data regarding particulars of patient, mode of injury, examination, treatment and outcome were collected and analyzed.

In order to compare our results we reviewed the existing literature related to pediatric facial bone fractures.

Results

Out of 45 children with facial bone fractures, 40 were above 5 years of age accounting 89% of total. Male to female ratio was 2:1. Most of these injuries were due to fall from height (53.33%) and road traffic accidents (28.88%) (Table 1). All of them had fracture of mandible. Concomitant fractures of maxillary alveolar margin and inferior orbital margin were seen in two patients each. One patient had fracture of zygoma besides mandibular fracture. Symphysis and para-symphysis was the commonest site of mandibular fractures, seen in 49% cases. Whereas, condylar and subcondylar fractures were present in 21% cases only (Table 2). Nine patients had clinical and/or radiological evidence of head injury. Inter-maxillary fixation alone was done in 12 cases mainly those with condylar and sub-condylar fracture and has been used in conjunction with transosseous wiring in 8 cases for fracture of dento-alveolar region and fracture edentulous mandible. Inter-maxillary fixation by direct or eyelet wiring was done in 10 cases of para-symphyseal fractures. Mini-plating with arch bars was done in 6 cases, to reduce and fix badly displaced fractures of angle and ramus of mandible. Postoperative wound infection was seen in 3 cases of compound fractures in which plating was done.

Table 1 Mode of injury

Cause	No	Percentage
Fall from height	24	53.33
Road traffic accident	13	28.88
Sports	03	6.66
Others (physical abuse)	05	11.00

Table 2 Pattern of mandibular fracture

Site of fracture	Number	Percentage
Parasymphysis	18	40
Condyle and sub-condyle	12	26.66
Symphysis	04	8.88
Dentoalveolar	03	6.66
Angle, body and ramus	08	17.77

Discussion

Facial bone fracture in children is infrequent before the age of 5 years. However, it is more common after 10 years of age when the incidence, pattern and distribution of fractures tend to parallel adults. In our study we observed that 11.11% of children with facial bone fractures were of <5 years of age. The incidences of facial bone fractures were 53.34% and 35.55% among children of 5–8 years and 9–12 years, respectively.

The first comprehensive study on this subject was conducted by Rowe et al. in 1967. They reported that about one percent of all facial bone fractures occur before 6 years of age and a total of 5% occur under the age of 12 years. The study conducted at John Hopkins hospital revealed that fewer than 5% of pediatric trauma patients had facial fractures and over 60% of these patients had significant head injury. In a similar series, Holland et al. (2001) reported that 3% of children presenting to the emergency department with facial trauma, had a fracture with 2:1 male to female ratio. Boys being more aggressive are more likely to get injured than girls and the gender ratio ranges from 2:1–3.5:1 [8–10].

Road traffic accident and fall from height are the common causes' of these injuries. In this study, accidental fall from height was the most common cause of facial bone fractures (53.33%). Scariot et al. (2009) also observed that accidental fall (38%) is the most common cause of these injuries. However, Holland in 2001 reported that road traffic accident is the most common cause, seen in 63%, respectively.

Mandible fracture is the most common facial bone fracture among admitted patients. In our study mandible fracture was present in all 45 cases. In a study of epidemiology of facial injuries in children and adolescents in US, Imahara et al. analyzed national trauma bank data from 2001–2005. According to them the most common facial fractures were mandible (32.7%), nasal (30.2%), and zygoma (28.6%) [11]. Results of other series are summarized below in Table 3 [12].

Table 3 Distribution of pediatric facial fractures

Author	Mandible	Nasal	Orbital	Zygomatic	Le Fort II	Maxillary alveolar
Hall (1972)	20	60			6	
Reil and Kranz (1995)	87		2	4.5	6.5	9.5
Kaban et al. (1993)	35	50.4	17.4	5.5		3
Ramba (1985)	65	5.8	7	17	8	22
Present Study	100	0	4.5	2.2		4.5

Figures expressed in percentages

The diagnosis is generally based upon clinical examination and radiological investigations such as OPG and/or CT scan. Midfacial fractures are often missed if CT scan of face is not being used in evaluation of these patients. Therefore, CT scan is the image of choice for mid-face, upper-face and intra-capsular fracture of condyle (Fig. 1) [13]. However, most of the mandible fractures can be diagnosed on OPG alone.

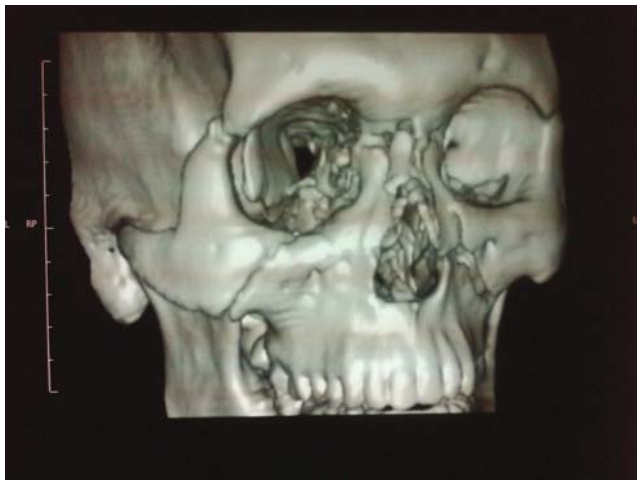

Fig. 1 Midfacial fracture diagnosed on 3 D CT of face

When formulating a plan of treatment for pediatric facial trauma, a number of elements must be considered. These include age of the patient, complexity of injury; time elapsed since injury, duration of proposed surgery and its approach. Mono-mandibular fixation by arch bar, acrylic splints or thermoplastic material may be the only acceptable alternatives in situation such as edentulous newborn with a mandibular body or symphyseal fracture. By 2 years of age 10 teeth exist in each arch and inter-maxillary fixation may be achieved. Before 2 and after 6 years of age missing teeth may limit this technique. Semi-rigid fixation with titanium plates currently offers the best fixation alternative. For un-displaced and greenstick fractures observation alone is sufficient [14–16].

This high osteogenic potential allows rapid union within 3 weeks. Non-union or fibrous union is almost never seen in pediatric patients. Nevertheless, complications like malocclusion and infection (2–5%) do occur. The high impact facial trauma is often found to be associated with head injury, seen in10%–30% of these cases [17]. The outcome depends upon the severity of facial injury, concomitant systemic injury, prompt and multidisciplinary management.

Conclusion

Accidental fall from height remains the most common cause of facial bone fracture in children. However, sports related injuries and road traffic accidents are more common in older children and adolescents. Mandible is the most common facial bone fractured due to facial trauma. The incidence of soft tissue injuries and nasal bone fracture is less reported because many of these patients get treated at private doctor's office and escape the institutional record. CT scan is the imaging modality of choice as three dimensional reconstruction of image can detect even unsuspected facial bone fractures. The high osteogenic potential of pediatric mandible allows non-surgical management to be successful in an increased proportion of younger patients.

References

1. James D (1985) Maxillofacial injuries in children, Rowe and Williams maxillofacial injuries, pp 538–558 Churchill Livingstone
2. Reil BS, Kranz S (1995) Traumatology of maxillofacial region in childhood. J Maxillofac Surg 4:200–206
3. Kim DB, Scapano M, Hardesty RA (1997) Facial fractures in children. West J Med 167:100–107
4. Oslon RA, Foseca RJ, Zeiter D, Osbon DB (1982) Fracture of mandible, a review of 580 case. J Oral Maxillofac Surg 40:23–28
5. Kaban LB (1993) Diagnosis and treatment of fracture of facial bones in children. J Oral Maxillofac Surg 51:722–729
6. Assael LA (1993) Clinical aspects of imaging in maxillofacial trauma. Radiol Clin North Am 31:209–220.
7. Rowe NL (1967) Fracture of facial skeleton in children. J Oral Surg 26:505–515
8. Hall RK (1972) Injuries of the face and jaws in children. Int J Oral Surg 1:65–75
9. Holland, Andrew JA, Broome C, Steinberg A, Cass DT (2001) Facial fractures in children. Paed Emer Care 17(3):157–160
10. Scariot R, Olliviera IA, Passeri lA, Rabellato Nl, Muller PR

(2009) Maxillofacial injuries in a group of Brazilian subjects under 18 years of age. J Appl Oral Sc 17(3):195–198
11. Imahara DS, Hopper RA (2008). Patterns and outcomes of pediatric facial fractures in the US, a survey of national trauma data bank. J Am Coll Surg 207(5):710–716
12. Ramba J (1985) Fractures of the facial bones in children. Int J Oral Surg 14:472–478
13. Zimmermann CE, Troulis MJ, Kaban LB (2005) Pediatric facial fractures: recent advances in prevention, diagnosis and management. Int J Oral Maxillofac Surg 34(8):823–833
14. Oji C (1998) Fractures of faciaL skeLeton in chiLdren, surgery of patients under the age of 11 years. J Cranio-maxillofac Surg 26:322–325
15. Koltai PJ, Rabkin D (1996) Management of facial trauma in children: Pediatr Clin North Am 43:1253–1275
16. Hardt N, Gottsauner A (1993). The treatment of mandibular fractures. J Cranio-maxillofa Surg 21:214-219.
17. Haug RH, Prather J, Indersano T (1990) An epidemiological survey of facial fractures and concomitant injuries. J Oral Maxillofac Surg 48(9):926–932