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Unusual Fracture of Maxilla Associated With Frontal and Sphenoid Bone Fracture: A Case Report And Review Of The Classification Systems Of Maxillary Fracture.

T Muthumani , Abu Dakir, and B Saravana Kumar.

Department of Oral and Maxillofacial Surgery, Sree Balaji Dental College and Hospital, Pallikkaranai, Chennai-600100, Tamil Nadu, India.

ABSTRACT

Facial bone fractures are common in road traffic accidents. With increasing high velocity trauma and the advancement in imaging technologies, complex fractures of maxilla which do not fall into conventional classification systems are frequently seen. We report a rare fracture pattern in maxilla which does not fall into the traditional fracture classification systems. Newer classification systems which can accurately and comprehensively describe these complex fractures should be developed.

Keywords: Facial trauma, Maxilla fracture, Maxillary fracture classification.

Corresponding author

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INTRODUCTION

Facial bone fractures commonly occur in road traffic accidents [1] .It is common in the third decade of life [2].The most common isolated fracture site is the nasal bone (37.7%), followed by the mandible (30%), orbital bones (7.6%), zygoma (5.7%), maxilla (1.3%) and the frontal bone (0.3%).Isolated maxillary fractures are rare .These fractures are isolated to the mid face in one third of cases or more commonly associated with frontal, naso ethmoid or mandibular fractures [3]. In 1901, Rene Le Fort classified maxillary fractures into three types I, II and III [4].This classification is considered widely as oversimplified since, modern computed tomographic images of patients with high velocity trauma reveal more complex patterns of fracture [5].In the case reported here, the computed tomographic image showed a vertical fracture line in the left maxilla which did not fall into any of the conventional classification systems for maxillary fractures.

Case Report

A 29 years old male reported to the out patient department in a Hospital in Chennai, India with a history of head and facial injury ten days back (patient had hit a pole by the side of road while travelling in a two wheeler) and had been treated for his calvarial fracture at the neurosurgical unit at the same Hospital in Chennai ,India. He had complaints of pain in the left side of the face and inability to chew on the left side. On intra oral examination he had open bite extending from the second premolar to the molars on the left side .The fractured segment did not show any mobility and it had splayed buccally. Mandible did not sustain any fracture. Mouth opening was adequate and he could make lateral excursive movements. Extraorally he had a through and through cut wound lateral to the left ala of nose(Fig 1) .Subconjunctival haemorrhage was present in the left eye .He did not have any visual impairment.

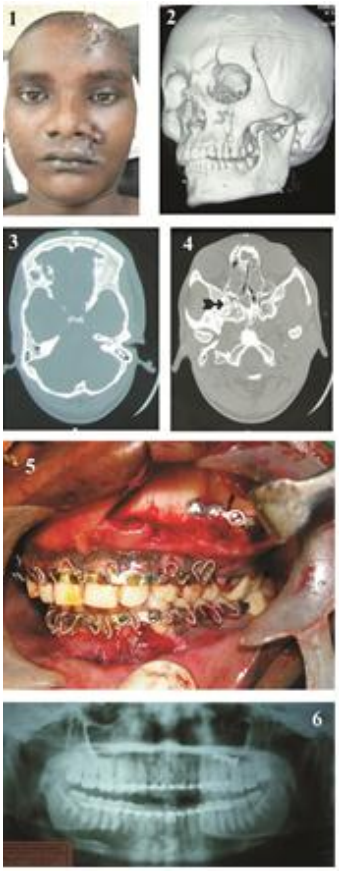

Figure 1: Pre-operative clinical presentation of the patient
Figure 2: Pre-operative computed tomography scan- shows frontal bone fracture, separation at frontonasal suture region, vertical fracture line in maxilla.
Figure 3: Axial section showing left frontal bone fracture.
Figure 4: Axial section showing right side lesser wing of sphenoid fracture.
Figure 5: Intra operative photograph- fixation with a non-compression miniplate.
Figure 6: Post-operative orthopantomogram-shows appropriate placement of the miniplate.

Computed tomographic image showed a fracture in the maxilla extending vertically from infra orbital foramen passing downwards along the facial surface of maxilla and passing between the first and second premolar (Fig.2). Along with the maxillary fracture, there were left frontal bone fracture(Fig 3), right side of lesser wing of sphenoid fractures(Fig.4) and separation at frontonasal suture(Fig.2). The patient did not have any active intervention for the cranial fractures by the neurosurgeons as he did not have any cerebro spinal fluid leak or any functional or aesthetic deformity.

The treatment planned was open reduction and internal fixation of the maxilla under general anaesthesia, under the neurosurgical observation. Naso endotracheal intubation was done. A split arch bar (Erich's pattern) was placed in the upper jaw and a continuous arch bar (Erich's pattern) was placed in the lower jaw .A sulcular incision was placed extending from the left canine to the distal line angle of first molar. An Obwegeser's curved osteotome was placed in the pterygomaxillary junction to mobilise the fragment. Reduction of the fracture was achieved by using a straight osteotome along the fracture line and placing an intermaxillary fixation. After achieving satisfactory reduction and occlusion, fixation was done using a four hole stainless steel non compression plate with four 6mm screws (Fig.5, Fig.6).

DISCUSSION

The incidence of maxillary fractures in various studies range from 4 to 14%[2,3,4,5,6].It is more common in males because they are involved more in activities leading to maxillofacial fractures .Mechanism of injury is usually direct blow to maxilla and usually results from accidents involving unrestrained seat occupants [1,2] .In the case presented, the mode of injury is by hitting over a pole by a person in a fast moving motorcycle and he was not wearing a helmet. The fracture in this case as revealed by computed tomographic image did not fit into any common classification of maxillary fractures.

The Le Fort system is a simple classification system which is still widely in use .But this classification is inadequate in that it does not define the facial skeletal supports or the more severely communited ,incomplete or combination maxillary fractures. Moreover it does not describe the fracture of the parts bearing the occlusal segment. The LeFort classification thus often underestimates the complexity of the fractures and limits the complete description of the overall facial fracture pattern, which often includes any array of fronto-orbital, zygomatic, and nasoethmoidal fractures in combination with maxillary injury [7].

The widespread advent of CT scanning in the United States in the past decade markedly improved the accuracy of fracture imaging to greater than 95%, subsequently enabling the treating surgeon to better determine the requirements for surgery and plan for approaches and methods of repair [8-11]. Considering these advancements there is a need for classification systems that provides a means for better description and communication of facial fracture characteristics between the radiologist and surgeon. In an attempt to improve interpretations of these images and applications of treatment[[12] described a method that looked at displacement and forces to create the fracture and noted the contribution of supporting vertical buttresses of the face especially for application and understanding of the role for internal fixation. Gruss et al [13] stressed the importance of the zygomatic arch in guiding the re-establishment of facial skeletal contours.

We have found the classification system given by (7) very useful to describe the fracture in this patient .Even the rare fracture pattern as presented here can be described based on this system- L V2i,V3,H1,H2,H3. This system is more of a coding system than a classification. As claimed by the authors this system helps in analysing the integrity of vertical and horizontal buttresses which are fundamental for proper reduction and fixation of the fractures. It also can serve as an accurate and easy means of communication between radiologists and surgeons. The main disadvantage of this system is that it does not describe the displacement and communition of fractures.

CONCLUSION

The LeFort classification although simple and used for many years does not accurately describe the multiple fracture sites now seen with modern imaging techniques. Newer classification systems that can accurately and comprehensively describe the fracture patterns should be developed and used widely.

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