Osteosyntheses of Lefort-I fracture

Dr. Ravi S. Patil*, Dr. Sanjay Sundar, Dr. Snehalata Patil*****

* Reader, Dept. of Oral & Maxillofacial Surgery, ** Professor, Dept. of Oral & Maxillofacial Surgery, Assistant Professor, Dept. of Conservative Dentistry & Endodontics, NET's Navodaya Dental College & Hospital, Raichur- 584101, KARNATAKA, INDIA

Abstracts: In mid-face the maxilla represents the bridge between the cranial base superiorly and the dental occlusal plane inferiorly. Its valuable relation with the oral cavity, nasal cavity, and orbits and the multitude of structures contained within and adjacent to it make the maxilla a functionally and cosmetically precise structure. Fracture of these facial bones is potentially life-threatening as well as disfiguring. In time surgical intervention of these fractures provides the best chance to correct deformity and prevent unfavourable sequelae. [Patil R et al NJIRM 2014; 5(2):127-130]

Key Words: Midfacial fractures, Lefort-I, Osteosyntheses

Author for correspondence: Dr. Ravi S. Patil, Reader, Dept. of Oral & Maxillofacial Surgery, NET's Navodaya Dental College & Hospital, P.O. Box: No: 26, Navodaya Nagar, Mantralayum Road, Raichur- 584101, KARNATAKA, INDIA, Mobile No: + 91 9844086715, +91 9743512188, E-mail: drravipatil6@gmail.com

Introduction Facial fractures commonly result from various traumatic insults to the face, and can occur in isolation or concomitantly with other injuries. Facial fracture diagnosis and treatment remain a challenging problem that frequently requires a multidisciplinary team approach[1]. Maxillary fractures account for approximately 6-25% of all facial fractures. One must first understand the facial growth and development. At birth, a child's cranium to facial ratio is 8:1. Around 5 years of age, it is 4:1. By adolescence, the ratio is 2:1; the adult ratio. Facial growth occurs through two general concepts, displacement and remodelling.

Maxillary fractures often result from high-energy blunt force injury to the facial skeleton. Typical mechanisms of trauma include motor vehicle accidents, altercations, and falls. The pattern of maxillary fractures depends on 2 predominant factors. First, as Le Fort described, the location, direction, and energy of the impact result in different injuries. Second, the anatomy of the mid face is oriented to provide strength and support to protect against injury. Vertical and horizontal bony bolstering in the face absorbs the energy of traumatic force. This serves to protect the more vital intracranial contents from damage during trauma. The management of fractures of the maxillofacial complex remains a challenge for the oral maxillofacial surgeon, demanding both skill and expertise. The success of treatment and implementation of preventive measures are more specifically dependent on epidemiologic assessments. Midfacial fractures can occur in isolation or in combination with other serious injuries, including mandibular, ophthalmologic, cranial, spinal, thoracic, and abdominal trauma, as well as upper and lower orthopedic injuries [2]. Deformities after facial trauma must be evaluated and treated as soon as possible [3]. Causes of these maxillofacial injuries were automobile (30.8%) and motorcycle (23.2%) accidents, altercations (9.7%), sport (6.3%), and warfare (9.7%). The distribution of maxillary fractures was 54.6% Le Fort II, 24.2% Le Fort I, 12.1% Le Fort III, and 9.1% alveolar [4]. Most (83.1%) mid-facial fractures occur in males, with the remainder (16.9%) occurring in females [5].

Case report: Eighteen years old male patient admitted to our unit in semiconscious state with oral and nasal bleeding due to road traffic accident. Preliminary treatment has been completed and immediately computed tomography of brain and face with all sections was carried out to rule out the head injury and suspected facial bone fractures. CT reports showed no history of head injury, but revealed fracture of mid-face and maxilla (Figure.2a and 2b). Extraoral and intraoral examination was performed and confirmed the following features; bilateral facial asymmetry (swelling), upper and lower lip lacerations, bleeding from nose and oral cavity, avulsed maxillary and mandibular anterior teeth, anterior open bite occlusion, and mobility of the maxilla (floating maxilla). Further, the PNS view of skull X rays (Figure.3), and routine hemogram was ruled out. Final diagnosis confirmed with Lefort-I fracture of mid-face. Physician and anaesthetist consent for the intervention under general anaesthesia has

been accepted and case has been prepared for the surgery.

Fig.1 Preoperative frontal view

Fig.2a Preoperative CT Coronal section- Arrows showing fractures of maxilla and antrum bilaterally

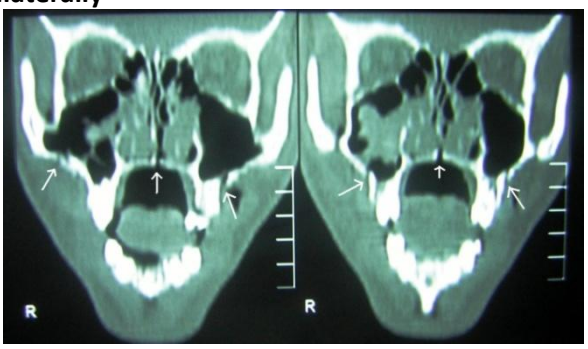

Fig.2b Preoperative CT Axial section- Arrows showing fractures and hematoma collection in antrum

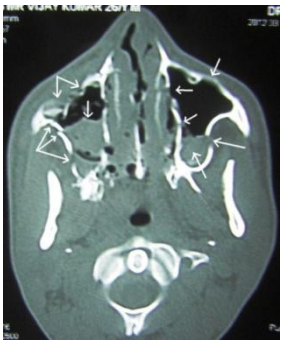

Fig.3 Preoperative PNS View of skull

Fig.4 Intraoperative circumvestibular incision and exposure of fracture site bilaterally

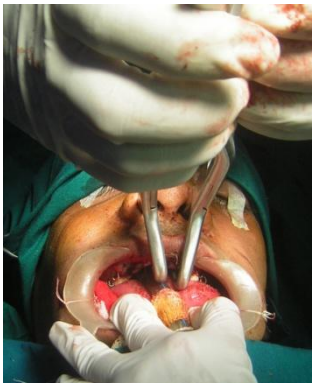

Fig.5 Intraoperative maxilla reduction by ROWE's disimpaction forceps

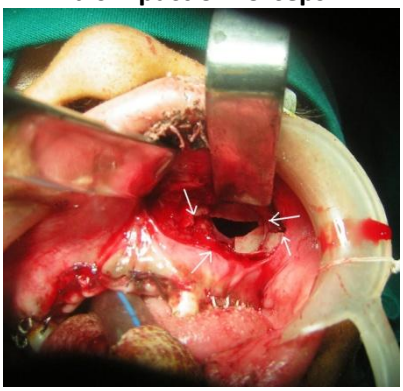

Fig.6 Intra operative miniplate osteosyntheses on left and right side

Fig.7 Postoperative AP and Lateral skull x rays showing mainiplates in-situ

Fig.8 Postoperative frontal view after 2 years

Intervention under general anaesthesia has been explained to the patient and patient's guardian in their own language with written consent.

Oral intubation could possible for anaesthetist due to missing maxillary and mandibular anterior teeth, followed by completion of scrubbing preparation. Intermaxillary arch bar placement was completed for dentate part prior to osteosyntheses. A vestibular incision was performed and subperiosteal dissection carried out to expose the fracture site on left side (Figure.4). Same procedure was carried on right side to expose the fracture fragments. After exposure of fracture fragments on both the side, reduction of these fragments performed by using ROWE's maxillary disimpaction forceps bilaterally to position these fragments in their original place (Figure. 5). Once reduction and position of fragments in place miniplate osteosyntheses was performed two each on either side (1.5mm plates and 8mm screws) to fix these fractured bones (Figure. 6) followed by wound closure with vicryl absorbable 3-0 suture material. Postoperative AP and Lateral view of skull x rays viewed for the position and fixation of the maxilla (Figure.7). Patient was advised for follow-up every week for 2 months later, followed by completion of complete oral rehabilitation. Two years of postoperative frontal view of the patient showing symmetry of the face and normal occlusion (Figure. 8).

Discussion: Much of the understanding of patterns of fracture propagation in mid-face trauma originates from the work of René Le Fort. In 1901, he reported his work on cadaver skulls that were subjected to blunt forces of various magnitudes and directions. He concluded that predictable patterns of fractures follow certain types of injuries.

Le Fort I fractures (horizontal) may result from a force of injury directed low on the maxillary alveolar rim in a downward direction. The fracture extends from the nasal septum to the lateral pyriform rims, travels horizontally above the teeth apices, crosses below the zygomaticomaxillary junction, and traverses the pterygomaxillary junction to interrupt the pterygoid plates [3].

Information regarding the mechanism of the injury may assist in determining a diagnosis. In particular, knowing the magnitude, location, and direction of the impact is helpful. High-energy trauma should cause concern about other possible concomitant injuries [1]. A history of mental status changes or loss of consciousness should cause concern regarding intracranial injury. The presence of any functional deficiencies, such as those related to airway, vision, cranial nerves, occlusion, or hearing, may provide clues to fracture location and resultant adjacent non-osseous injury.

Many articles pertaining to the incidence and causes of maxillofacial injuries have been published. In 2003, Motamedi reported the distribution of facial fractures as 72.9% mandibular, 13.9% maxillary, 13.5% zygomatic, 24.0% zygomatico-orbital, 2.1% cranial, 2.1% nasal, and 1.6% frontal injuries [4]. According to Cook and Rowe, midfacial injuries occur most frequently in individuals aged 21–30 years (43%). The 11–20year and 31–40year age groups each account for 20% of these fractures [5].

One goal of treatment is to restore proper anatomic relationships. In particular, attempt to normalize the integrity of the support bolsters of the facial skeleton, the mid-facial height and projection, and dental occlusion and masticatory function. Fixation of unstable fracture segments to stable structures is the objective of definitive surgical treatment of maxillary fractures [2].

The partial or segmental alveolar ridge fractures can likewise be treated with MMF (Maxillomandibular Fixation) alone after proper

reduction. However, unstable fractures require an additional means of fixation. The method of choice for fixation is through miniplates placed via an open approach.

Prior to surgery, inform the patient regarding the implications of the anticipated procedures. Additionally, need to explain risks and possible complications of the procedure, including temporary or permanent paresthesia, cerebrospinal fluid leak, meningitis, sinus infection or mucocele, anosmia, malocclusion, infection of implants, osteomyelitis, malunion or non-union, external deformity, plate exposure, tooth injury, and the possible need for additional surgery.

We conclude that, fractures of facial bones are potentially life-threatening as well as disfiguring. In time intervention provides the best chance to correct deformity and prevent unfavourable sequelae.

References:

1. Lair Mambrini Furtado, Flaviana Soares Rocha, Cláudia Jordão Silva, Iris Malagoni Marquez, Darceny Zanetta-Barbosa. Retrospective analysis of maxillofacial fractures: a 7-year study of 748 patients: Int J Dent, Recife, 2009; 8(4):177-82.
2. Sertac Aktop, Onur Gonul, Tulin Satilmis, Hasan Garip and Kamil Goker. Management of Midfacial Fractures: A Textbook of Advanced Oral and Maxillofacial Surgery, Page 415-45.
3. Erdem Güven, Alper Mete Uğurlu, Samet Vasfi Kuvat, Deniz Kanliada, Ufuk Emekli. Minimally invasive approaches in severe panfacial fractures: Turkish Journal of Trauma & Emergency Surgery; 2010; 16 (6):541-45.
4. Motamedi M H K. An Assessment of maxillofacial fractures: A 5-year study of 237 patients. J Oral Maxillofac Surg. 2003; 61:61-64.
5. Cook H E, Rowe M. A retrospective study of 356 midfacial fractures occurring in 225 patients. J Oral Maxillolac Surg. 1990; 48: 574-78.

Conflict of interest: None
Funding: None