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Principles Of Panfacial Trauma – A Review

Dr. Balakrishnan.[1], Dr. G.Sumathy [1]*,Dr. Vijay Ebenezer[2]

[1]Research scholar, BIHER ,SBDCH Professor, Department of Oral and Maxillofacial Surgery, Sree Balaji Dental College and Hospital, BIHER, Chennai- 600100, Tamil Nadu, India.
*[1]*Supervisor ,Department of Anatomy, Sree Balaji Dental College and Hospital, BIHER, Chennai- 600100, Tamil Nadu, India.*
[2]Prof & HOD, Department of Oral and Maxillofacial Surgery, Sree Balaji Dental College and Hospital, BIHER, Chennai- 600100, Tamil Nadu, India.

Abstract: Traumatic panfacial fracture fixation is one of the most complex reconstructive surgical procedures. There are many principles in the literature regarding the repair of panfacial injuries in a stepwise manner. The primary goal in management of these approaches is to achieve the occlusal relationship, so that other regions align eventually. Through proper occlusion, the mandibular-maxillary region with the skull base, the spatial relationships and stability of midface buttresses and pillars with time can be re-achieved. Such injuries seem difficult at the beginning, but if a proper stepwise method is followed with needful understanding of the principles of fixation, the outcomes are optimized. There are different mechanisms through which injury occurs which is along the zones of weakness within the midface and mandible shows a common fracture pattern. The Standard fracture patterns are classified by LeFort. Still generally, there is a combination of various components of the LeFort fractures and other fractures. The components of the ideal panfacial fracture involve the lower third, the middle third, and upper third of the face, but the involvement of the midface and mandible constitute the same principles of repair, as a true panfacial fracture would have.

Keywords: panfacial fracture, facial trauma, occlusion Achieving occlusion, spatial relationships of maxillary region(midface) and mandible, Noe complex , Mid face trauma , Nasal bone fracture.

INTRODUCTION

Determining the complexity of the Pan facial trauma can be a great challenge to the operating Maxillofacial Surgeon. When divided into small parts, each fracture is described as reparable. When most of the facial structure is fractured, it is very much difficult to re-structure the original three-dimensional shape and to properly reposition the fractured fragments. Practically, that reconstruction should be performed from the known to the unknown, which might also be taken as operating from the stable to the unstable structures. In fact, first occlusion should be achieved. The reconstruction actually is established from the periphery towards the center. Using the available approaches, the more solid cranial areas are to be repaired first which will help in establishing the template for repositioning the zygomas. The facial height can be reestablished by completing the reconstruction of the mandible. So, the mandibular teeth and arch can serve as a template for the re-establishing occlusion with the maxillary dental arches. Tooth loss and communited fractures may require the use of surgical splints and guides, and the surgeon should also not hesitate to apply it. In panfacial trauma, the reduction of sub-condylar fractures—particularly bilateral subcondylar fractures—becomes an major component in the repair, because the mandibular ramus height is a critical guide to the overall facial height. The maxilla can then be stabilized to the reposition the zygoma above and to the dentition below. Once the maxilla is repositioned and reconstructed, attention then can be turned to the central face which is the nose and NOE complex region (NOE fractures). Finally, after the facial architecture has been reestablished, the orbital walls are reconstituted. If this has been performed successfully, a postoperative CT scan should confirm a reasonably normal facial skeletal architecture.

These are all the type of fractures which can occur in the upper and middle third of the face.

- Le Fort I
- Le Fort II
- Le Fort III
- Frontal sinus
- Nasal
- Bilateral NOE
- Bilateral zygoma
- Bilateral orbit including the medial and lateral wall, and orbital floor and roof
- Simple sagittal split of the palate

DISCUSSION

The primary and the most important goal is to restore the alignment in all three dimensions, fixation of the plate to the maxillofacial buttresses wherever required. One of the major advancements in the diagnosis of pan facial fractures is recent developments in 3-D imaging, mainly in CT and cone beam technology. This helps in the assessment of injuries and is a prerequisite for proper diagnosis, planning, reduction, and outcome. Radiographic diagnosis need not to be restricted to the 3-D views since multiplanar 2-D view may show critical features not seen in the 3-D views. Also using of an intraoperative model or skull greatly helps in contouring of hardware and facilitates proper skeletal reconstruction Sequencing of the surgery:

1. Re-establish the maxillo-mandibular unit as the first major step of theg (bottom-up).
2. Starting with the reduction and fixation at the level of the calvarium and working in a caudal direction (top-down).
3. Also, care should be taken that with this second option of sequencing, re-establishment of the proper maxillomandibular stability is very important, but may be achieved later in the stages.

Reestablishing the maxillo-mandibular stability and occlusion should always be the first priority. In a Le Fort type fracture with no sagittal split palate without mandibular fracture, reestablishment of the occlusion can be done just by using arch bars and IMF (closed reduction). In a Le Fort type fracture where there is a sagittal split of the palate but no mandibular fracture, then the mandibular arch can be used as a guide in achieving the occlusion of the maxillary arch with placement of arch bars and IMF. The recommended sequence for this portion of the treatment of the palate is dependent on whether it is a simple or complex (comminuted) palatal fracture. If there is a Le Fort type fracture and a sagittal split of the palate together with mandibular fractures, reestablishment of the proper width of the disrupted dental arches is more difficult. The surgeon must reconstruct one dental arch and use it as a template for the other. This can be done one of two ways. The first being anatomic reduction and the second using model surgery and fabrication of splints on dental casts. In the illustration, the mandible was anatomically reconstructed and used to restore the width of the maxilla through the use of MMF (first option). The second option involves taking dental impressions, making dental models, and from these models, performing model surgery to examine and reestablish the premorbid occlusion. In these complex cases, cuts need to be made in the maxillary portion and the mandibular portion of the dental models to recreate the fractures to determine the premorbid occlusion and contour of the maxillary and mandibular arches.Once the maxillary and mandibular model surgery has been performed, palatal and/or mandibular splints are fabricated for use during surgery. This technique may also be considered in any case where either the palatal fracture or mandibular fracture is very complicated but the other portion of the maxillomandibular unit is intact. The surgeon may choose to use dental impressions and models with any complex fracture involving the dentition where proper premorbid occlusion is uncertain. If a mandibular lingual splint is needed, it is fabricated and fixed to the mandible, also using arch bars and wires. In cases where there are condylar fractures, open treatment of these fractures will restore proper mandibular height and chin position.In this illustration the mandible was reduced and fixed and then used as a guide for the reduction of the palate.

CONCLUSION

In summary, the sequence of pan-facial trauma repair must be in a stepwise fashion. The restoration of the occlusion is the primary goal in the beginning of the sequencing process. The Le-Fort I level of the maxilla has to be restored in its width with IMF fixation. The unit is then restored to its vertical height and position in relation to the skull base. The remaining midface is then reconstructed by full exposure and reduction with the elements of repair involving restoration of the lateral wall of the orbit at the zygomatico-sphenoid junction and the projection of the zygomatic process of the temporal bone. The naso-orbito-ethmoid fractures are reduced at this point as well. After all of these fractures are addressed, then the LeFort I level can be plated because this is the area. Ultimately, panfacial fractures are managed through systematic sequencing steps focusing on the occlusion as the foundation for proper alignment.

CONFLICT OF INTEREST

Conflict of interest declared none.

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