Panfacial Trauma - A Case Report
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Abstract:
Since last two decades much attention has been focused on developing an organized plan of repair that optimized retention of post traumatic facial form and functions. Successful reconstructions can be achieved through a flexible approach that adheres to several key principles. The goal of treatment as with all facial fracture is to restore both the functions and pre-injury 3-dimensional facial contours. To achieve this goal two common sequences of management of Panfacial fractures are proposed, “Bottom up and inside out” or “Top down and outside in”. Other sequences exist but there are variations of these two major approaches.

In the present day scenario because of high velocity accidents, patterns of fracture are so varied. It is difficult to follow an established pattern of sequencing and organizing the repair of Panfacial fractures. The correct timing of surgical intervention and use of rigid fixation allows the restoration of morphological and functional nature of face after Panfacial fractures. The aim of presenting the paper is to analyze the principles that determine the choice of method of treatment and the outcome in traumatic injuries.

Key Words: Panfacial Fracture, Orbital Floor Defect, Midface Fracture

Received on: 07/03/10 Accepted on: 18/05/2010

Introduction:
There is no accepted description & classification of Panfacial fractures. Panfacial fractures involves fractures of several bones of face, including mandible, maxilla, zygomatic complex, most often nasoorbitoethmoid (NOE) & frontal bone. They are associated with malocclusion, dish face deformity, enophthalmos, diplopia, CSF leak & soft tissue injuries. Markowitz & Manson describe frontal and palatoalveolar fractures as extended injuries of panfacial fractures. When there are multiple facial fractures involving upper & lower face reconstruction should be approached as puzzle.

The surgical approaches to Panfacial fracture have changed in last few years. The wide exposure of fracture foci, use of cavarial or iliac crest bone grafts for reconstruction, high resolution computed tomography & rigid fixation systems have brought about the changes for the better. The form of face is restored in three dimensional space i.e. width, anteroposterior projection and vertical height. Failure to achieve a direct visualization of all fractures and unstable fixations are common reasons for persistent deformity. Neverth less despite aggressive treatment some residual post-traumatic deformity may persist which may warrant for second correction surgery.

Case Report:
A 24 year male trauma victim involved in RTA sustaining blunt facial trauma reported in our institute, with bilateral periorbital ecchymosis, subconjuctival haemorrhage, enophthalmos, dish face...
deformity and multiple facial fractures. Patient had persistent oral bleeding, airway obstruction & low SPO$_2$ and thus he underwent emergency tracheotomy. Radiographic and 3-dimensional CT images [Fig.1,2,3] revealed mandibular symphysis fracture, Le Fort II, Comminuted NOE fracture, ZMC fracture on left side and comminution of orbital floor on left side with herniation of orbital contents into maxillary sinus.

Fig.1& 2 Dimensional CT showing panfacial fractures (Le Fort II, Frontonasal, Gross Communion of left anterior wall of maxillary sinus & midsymphysis region.)

Patient underwent open reduction and internal fixation of panfacial fractures through combination of subciliary, lateral brow, horizontal incision in frontonasal area & intraoral vestibular approaches in sequence. First symphysis fracture was reduced keeping check on lateral flaring of condyles. After achieving good occlusion IMF was done. Right infra-orbital rim fracture was reduced. Next fracture at left frontozygomatic suture exposed and after establishing vertical height fracture fragments were reduced and fixed. Left comminuted infra-orbital rim was exposed, orbital floor explored and herniated contents were teased out and fixation of fracture achieved.

Defect size was assessed to be 3x2 cm and iliac bone graft harvested to bridge the gap. In left buttress region comminuted fragments of anterior wall of sinus were aligned and fixation achieved using two mini plates(fig.4). Lastly NOE fracture was reduced and fixation done. Graft was slid in orbital defect and secured in position. Because of gross comminution and lack of support there was backward displacement of nasal complex and there remained residual dish deformity which needs revision surgery later.

Fig. 3: Axial CT scan showing bilateral fracture of maxilla and nasal septum with gross displacement.

Fig.4: Post-operative PNS view showing fixation of panfacial fracture using miniplates
Discussion:
The management of Panfacial fracture is extremely complex. The significant complication associated with Panfacial fracture is widening of facial complex. Much has been written about proper sequencing of treatment for Panfacial fractures. “Bottom up & inside out” or “Top down & outside in” have been used to describe 2 of classic approaches for management of Panfacial fractures. When geometry of dental arches is disturbed Kelly et al suggested reducing hard palate as guide for mandibular reconstruction. Gruss et al advised reduction of zygomatic arch and malar projection first to reestablish the “Outer facial frame” before NOE or “Inner facial frame” is reduced. Merville recommended “Top to Bottom” sequence in 1974 if NOE was involved in panfacial fracture. Tulio and Sesenna believed establishment of condyles together with mandibular arch is the appropriate first step. When there are concomitant maxillary and mandibular arch fractures it is difficult to reestablish occlusion and 3D relationship of jaws. Manson and Glassman advised fixing palatal fracture first and then using the maxillary arch as a template for restoration of mandibular arch. The fracture pattern where difficulties commonly arise are those occurring in symphysis and parasymphysis region associated with fracture of condyle(s) resulting in retridispacement of mandible with widening at angles. Under such conditions all fractures should be exposed prior to reduction and fixation of anyone of them. Pressure should be applied at gonial angles to close any lingual gap to establish lower facial width and achieve correct anterior projection.

The naso-orbital region plays a paramount role in facial esthetics. Insufficient correction of telecanthus and the internal orbit and inadequate skeletal support were the most frequent causes for surgical failures. The “Bottom up and inside out” approach allowed stable reconstruction of mandibular fracture & establishes the mandible as foundation for setting the rest of face especially when reasonable dentition is present & with atleast one intact condyle. The occlusion is set by placing IMF. This would ensure maxilla is in proper position. Zygomaticomaxillary Complex is reduced and fixated first to correct anteroposterior and transverse dimensions of face. This allows more accurate repositioning of upper midface before fixation at zygo buttress. Maxilla is now fixated along zygomaticomaxillay buttress “Inner facial frame” or NOE complex is then reduced and stabilized. The internal orbit is next reconstructed. In the final stage of Panfacial trauma the orbital floors and nasal dorsums are reconstructed with bone grafts or alloplastic substitutes.

“Top down and outside in” starts at zygomatic region. Frontozygomatic suture is reduced and fixated. Zygomatic arch is reduced properly to avoid under projection of midface. Then NOE complex is positioned. Maxilla is addressed next using the position of zygomaticomaxillary buttress and piriform rim as guide. Maxillo-mandibular fixation can be established. Reduction and fixation of mandibular condyle/ symphysis/ body/angle fractures are then reduced. Subcondylar fracture can be treated closed with use of this approach.

Neither one of these techniques will achieve optimal result in every situation, rather approach that goes from known to unknown is certainly more accurate. If there is calvarial injury sequencing should start caudally and proceed cranially to achieve optimal results. If there is remarkable commuiniation of mandible sequencing should start cranially to
caudally. Thus maxillofacial surgeon should be comfortable with both approaches and should use known landmarks to achieve optimal results.

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