CASE REPORT

Unusual Severe Superolateral Dislocation of Right Condyle Associated with Sagittal Split of Articular Eminence in Pan-facial Trauma Managed with Inverted L-plate: A Case Report

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ABSTRACT

Head and neck trauma is a challenging case for a maxillofacial surgeon because not only preinjury anatomy needs to be achieved but also esthetic has to be improved. Management of such patients is quite challenging and also requires a frequent multidisciplinary team intervention. One of the cause of such trauma is unprotected driving or high-velocity collision. Pan-facial trauma not only disrupts normal facial anatomy but also hinders normal functions like vision (dystopia, diplopia, enophthalmos), respiration (airway) and olfactory senses, mastication and natural occlusion and intercuspation, deglutition, and overall esthetic of the patient. Restoring and rehabilitation of preinjury contour of facial skeleton in such patient of trauma requires artistic work of the operating maxillofacial surgeon. The treatment modality in case of trauma is open reduction and internal fixation (ORIF) under general anesthesia (GA). Various approaches have been suggested to achieve near normal anatomy. Past research suggested “top to bottom” or “bottom to top” along with “outward to inward” or “inward to outward;” The main aim being restoring horizontal and vertical facial pillars.

Keywords: Lower third facial fracture, Mid facial fracture, Open reduction and internal fixation, Pan-facial trauma, Superolateral dislocation of the intact mandibular condyle.

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INTRODUCTION

In pan-facial trauma, there is involvement of multiple facial bones like maxilla, zygomatic complex, naso-orbital-ethmoid complex, and mandible. These bones are commonly involved.

There have been very few cases that revealed superolateral dislocation of the intact mandibular condyle (SDIMC). Allen and Young presented with classification into two types: type I (lateral subluxation), in which the condyle is laterally displaced out of the fossa, and type II (complete dislocation), in which the condyle has been laterally dislocated as well as superiorly entering in the temporal fossa. Another addition in classification was provided by Satoh et al. for type II dislocation by subdividing it into three categories: type IIA, in which the condyle is not hooked above the zygomatic arch; type IIB, in which the condyle is hooked above the zygomatic arch; and type IIC, in which the condyle is lodged inside the zygomatic arch, which is fractured. The most commonly encountered cause of superolateral dislocation of intact condyle is the high-energy mechanism of trauma that may lead to generalized facial bone fractures or pan-facial fractures. Association of mandibular fracture and SDIMC is common but other facial fractures and SDIMC are rarely associated.

Multiple bony injury is associated with soft tissue injury. The facial deformities are termed as “dish face” due change of facial height, projection with increased facial width, and associated enophthalmos.

CASE DESCRIPTION

A male patient of 35 years of age presented to the Emergency Department of Mahatma Gandhi Hospital, Jaipur, following a history of road traffic accident (RTA) (collision with trailer of tractor). The patient did not present any positive history of loss of consciousness and vomiting. There was a positive history of ear and nasal bleed.

The patient was examined for chief complain of pain and swelling over face following accident and also complained of bleeding episodes from the oral cavity. On extraoral examination of the patient, step deformity was present over the frontozygomatic suture region and infraorbital rim bilaterally, zygomatic arch of both sides, and nasofrontal suture area, and intraoral examination revealed step deformity at the symphysial region of mandible along with difficult intercuspation of maxillary and mandibular teeth and tenderness at the bilateral buttress region. Bridal wiring was done to approximate fractured mandibular segment and minimize bleeding from the fracture site (Figs 1 to 13).

The clinical and radiologic analysis revealed fracture of zygomatic, mandibular symphysis, palatal split, and naso-orbital-ethmoid complex fracture, which was collectively termed as pan-facial fracture.
The patient was informed about need for surgical intervention. Routine blood investigations necessary for operating under general anesthesia (GA) were performed. Submental route of intubation was preferred for induction of GA. The patient was kept nil by mouth 6 hours prior to surgery. The patient was painted and draped in the supine position. Intermaxillary fixation was done. Incision was placed over symphysis region extraorally to exposed fractured segments and fixation was performed. In this case, the hemiconal approach was preferred with zig-zag pattern of incision line to approach zygomatic arch and superolaterally displaced intact mandibular condyle. Hemicoronal incision was placed to expose fractured segments of middle third facial skeleton. The zygomatic arch of was exposed and fixed. The inverted L-shaped plate was used to fix sagittal fracture of articular eminence. Orbital floor and infraorbital rim were exposed, reduced, and fixed using the transconjunctival approach. Intraoral vestibular incision was placed to expose fractured buttress fragments and were reduced. Saddle nose was corrected using graft harvested from the right iliac crest region. After reduction and fixation of fractured facial segments, closure was done in layers.

The patient was discharged following the uneventful postoperative period. Following management of facial fractures, the patient is planned for exenteration of right eye ball followed by prosthetic rehabilitation. Two methods can be performed: one being removal of entire orbital content and another being incision is placed along iris and contents of eye ball are removed followed.
by placement of plastic disc or glass ball and closure of wound; this process prevents shrinkage of socket and retains adequate pocket for prosthesis.

**Discussion**

The term “pan-facial” has been poorly defined, with no single accepted definition. Facial fracture patterns that incorporate or involve at least three out of the four axial segments of the facial skeleton, that is, frontal, upper midface, lower midface, and mandible, are included in the pan-facial fracture category. None of the literatures available properly classify pan-facial fractures. The main goal of treatment for all facial fractures is to restore both the function and preinjury three-dimensional (3-D) facial contours. To achieve this goal, various approaches have been proposed, which include “bottom to top,” “top to bottom,” “inside-out,” or
outside-in." Many surgeons prefer the mandible as a foundation on which to reconstruct the occlusion first. A mandible reconstructed properly will reestablish lower facial width and projection and posterior facial height.³

In the cases that were diagnosed with involving dental arches, Kelly et al. proposed that the hard palate should first be reduced and stabilized as a guide for reconstruction of mandible.⁴ Another proposition was made by Gruss and Phillips stating that the zygomatic arch and malar projection should be managed first thus reestablishing the outer facial frame and restoring facial width and projection prior to naso-orbital ethmoidal complex, maxillary and mandibular reconstruction.⁵ In cases where the naso-orbital ethmoidal complex was involved, Merville suggested that “top to bottom” sequencing of reduction is preferable. No proposition of the treatment protocol has been suggested in case where fractured bone segments were malunited and partially absorbed. Managing such cases becomes extremely challenging in view of controlling facial height, width, and projection.⁶

Markowitz and Manson described palatoalveolar and frontal bone fractures as extended injuries with pan-facial fractures. Early management of pan-facial trauma has multiple advantages. There is reduction in risk of postoperative infection along with reduced chances of soft tissue expansion.⁷ Sometimes, there is delay in treatment of patients with pan-facial trauma beyond a reasonable time due to associated neurologic or systemic injuries rendering them medically unstable.⁷ Treatment beyond 2 weeks after trauma is delayed then there are increased chances of difficulty in achievement of proper and adequate reduction of dislocated fracture segments. Carl and Mathog considered that there is initiation of grey stage, that is, healing of bone beyond a period of 3 weeks where there is resorption and remodeling at the edges of fracture fragments, thus making it difficult to achieve proper and adequate anatomic reduction. Thus, it may lead to bony defect/ nonunion/delayed union/malunion of bone fragments.⁸

The operating surgeon needs to plan treatment and outcomes prior for that collection of all data related to case, which aid in analyzing deformity. Computer tomography with virtual 3-D reconstruction is essential for diagnosis and treatment of panfacial fractures as extent of coverage is from vertex till inferior border of mandible. With availability of the reconstruction option, better understanding of overall relationships is obtained but thorough assessment of some areas like internal orbit. Three-dimensional facial models are very much helpful for managing delayed pan-facial trauma cases. There is provision of better spatial relationships of displaced fragments of facial skeleton, and proper planning of treatment can be done at ease by the operating surgeon.⁸

There has been limited documentation and reporting of delayed pan-facial fracture treatment schemes. Use of mandible as guide for reconstruction is case of fresh pan-facial trauma as mentioned in previous literature is sensible because it the strongest facial bone and reduction of mandible in comparison with maxilla is easier. On initial stabilization of occlusion of lower midface with reconstructed mandible deformities like rotation of maxilla, anterior open bite can be avoided.⁹,¹⁰

In cases where there is fracture of maxillary and mandibular dental arches, reestablishment of normal occlusion and 3-D relationships of both the jaws becomes difficult. Manson and Glassman suggested that initially palatal fracture should be reduced thus the provide a template for mandibular dental arch restoration. This leads to establishment of proper mandibular width but this method is only feasible in cases of fresh fractures as in delayed cases due to initiation of callus formation and associated bone healing sequelae accurate reduction of palatal fracture becomes difficult especially in maintaining occlusion. Repairing ascending rami and condylar regions of mandible helps in restoring facial projection and height. But in cases where mandibular condyles, dental arch with or without angle involvement is present, then there is an increase in width of lower third of face. Presence of retrusion of mandible may worsen the...
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Tullio and Sesenna suggested that reestablishment of the condyles along with the mandibular dental arch is the appropriate first step. Reduction of fractured mandibular condyle(s) is of prime importance in the repair of pan-facial fractures by facilitating the further repositioning of the midface. The best approach providing visibility is the bicoronal approach, as it is helpful for the upper and outer facial frame reconstruction. Deformities of soft tissues need to be seriously considered in treatment. The soft tissues are considered as “fourth dimension” of facial reconstruction. Bone that has been perfectly or precisely reduced need not lead to provision of proper facial appearance. There are chances for scarring, contraction leading to formation of uneven soft tissues following reattachment of soft tissues at frontozygomatic suture, medial and lateral canthal regions, infraorbital rim, and temporal fascia leading to zygomatic arch exposure. Surgical intervention not only helps in proper realignment of fractured segments but also leads to insult to soft tissues that are already damaged and contused. Thus, there is a requirement for additional or subsequent surgical procedure for readressing deformities occurring in soft tissues.

**Conclusion**

Most important criteria in managing a case of pan-facial trauma is proper anatomical knowledge possessed by operating maxillofacial surgery. The minimal invasive approach should be preferred for pan-facial trauma management. Main focus should be in restoring proper occlusion, vertical height, and horizontal width and along with exclusion of any muscle entrapment leading to abnormal functioning of eye muscles and globe and other anatomical structures. This case was unique in terms of persistent superolateral displacement of intact mandibular condyle even after fixation of the zygomatic arch; to keep condyle in its anatomic place, the inverted “L” plate was used. Results obtained were functionally satisfactory even in dynamic motion and we propose it as an adequate alternative for treatment of superolateral dislocation of intact mandibular condyle.
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