

## Balloning technique for orbital floor fracture reduction in neglected midfacial fracture: a case report

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### Abstract

**Objective:** Midfacial fracture is a fracture that separates maxilla from the middle part of face. Orbital floor fracture includes in midfacial fracture that difficult to treat. The aggravating factor of the treatment are depressed fractures and infection. We use ballooning technique which is inflated in the maxillary sinus to lift fracture segment of orbital floor and to prevent the orbital floor displaced to the maxillary sinus.

**Methods:** There were multiple lacerations at left eye and nose region, post suturing at left Zygoma and left cheek region. Intraoral findings there were multiple laceration, then the patient was examined a complete blood count, chest xray, cervical lateral examination, and 3D CT-Scan examination.

**Results:** Examination of head and panoramic xray was performed and showed there was no bone discontinuity, contact and stable fracture segments. Examination of the 5th day post operative showed minimal pus drainage, leukocytes were within normal limits and other lab results were normal. Physical examination showed minimum scar, there was no dehiscence, symmetrical face and drain was performed at left Zygoma region, symmetrical orbital, intact and stable occlusion.

**Conclusion:** In this case, ballooning technique was successfully reduced the ruptured orbital floor and obtained good result.

**Keywords:** Gingival enlargement, Gingival hyperpigmentation, Gingivectomy, Gingival depigmentation

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### Introduction

Fracture of bone is discontinuity of bone, cartilage of joint and epiphysis, whether it occurs partially or totally. Fracture is commonly caused by trauma where excessive direct or indirect pressure is applied on bone and often accompanied by injury on surrounding tissues.

<sup>1</sup>Maxillofacial fracture is a fracture which affects one third mid facial and lower facial region or mandible. This region is the most prominent part of human body, thus it is prone to fracture. There are several etiologic factors which can cause maxillofacial fracture, some of those are traffic accidents, work accidents, accidents due to sport activity, warfare related accidents, and also from abusive or violent acts. However, the most common causes are happened to be traffic accidents.<sup>1</sup>

In the last century, Rene LeFort was the first one who successfully documented possible fracture pattern specifically on mid-facial third which was caused by direct blunt force on the face.<sup>2</sup> Le Fort fracture classification is not only limited to fracture of maxillary bone because it usually also involves fractures of other facial bones structures. LeFort described three transverse zonal weakness on midfacial bone structure which allowed prediction of fracture pattern.<sup>2</sup>

Le Fort I Fracture; a fracture with horizontal pattern in transmaxilla direction which happens at height margin of bilateral piriform, resulting a condition of "floating palate" or "floating jaw". This fracture separates the relationship between maxillary

alveolaris and cranial base.<sup>2</sup> LeFort I fracture is usually caused by direct blunt impact higher than of teeth level.

Fracture occurs at lateral border of piriform sinus, passes through lateral antral wall, posterior maxillary tubercle, and through pterygoid junction. Fracture can also occur around nasal septum and cartilage area. Strain of external and internal pterygoid muscle causes maxilla to be displaced inferiorly and posteriorly. Classic open bite is common finding in this fracture.<sup>2</sup>

Le Fort II Fracture; pyramidal or subzygomatic fracture separates centre of midface and orbitozygomatic complex. LeFort II fracture is usually caused by direct impact around nasal bone level. Fracture occurs along nasofrontal suture, passes through lacrimal bone, and through infraorbital line at maxillozygomatic suture area.<sup>3</sup> When the orbital rim experiences blunt impact, the deformation force is transmitted deeper into the orbit and consequently fractures the thin bones of the orbital floor. This results in downward displacement of the intra-orbital muscles and fats into the maxillary sinuses. This is called blowout fracture or orbital floor fracture, which can cause various complications such as enophthalmos, extra-ocular movement disorder, and diplopia. In the presence of these complications, the fracture site should be accurately evaluated early after the injury through computed tomography (CT) study, and operative reduction should be performed instead of conser

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vative, non-operative treatments.

Le Fort III Fracture; this fracture is also called “craniofacial disjunction”. Strong impact at orbital level which causes this LeFort III fracture, will separate frontozygomatic suture and nasofrontal junction. Fracture line passes along temporozygomatic and frontozygomatic sutures, lateral orbital wall, through inferior orbital fissure, medially along nasofrontal suture, and ends at pterygomaxilla fossae.

Neglected fracture commonly occurs in low educated and low social economic environment. Treatment of bone fracture more than 72 hours period after first trauma happens is usually accompanied with bacterial infection or even pus, making the management of neglected fracture becomes more complex thus requires more intensive mode of treatment. Significant delay in fracture management increases the risk of infection.<sup>1</sup>

Untreated infection with open wound surface as bacteria port of entry can elicit the formation of selulitis. Selulitis can occur in any area where there is soft tissue and loose connective tissue, especially at face and neck region where the immune system in this area is not maximum.<sup>4</sup>

Condition when a fracture and infection occurs, main goal in primary management is to initially treat the infection, and antibiotic administration. If bmanagement of this condition is delayed, patient is at risk of having Systemic Inflammatory Response Syndrome (SIRS). SIRS related to infection is known as Septic.<sup>5</sup>

In this case report, we will discuss an untreated maxillofacial open fracture which accompanied by bacterial infection hence complicates the management of fracture. Besides that, management of orbital area fracture required few technique modification using ballooning technique. Previously mentioned technique utilize ballooning instrument inside maxillary sinus in order to elevate fractured orbital base so that fragments of fracture would be at the same height level, and also to avoid fragments shifting into maxillary sinus. These two findings makes this case more interesting to be discussed.

### Case Report

A-31-years old male came to Department of Oral and Maxillofacial Surgery Emergency General Hospital Dr. Hasan Sadikin with chief complaint of broken upper jaw since 6 days ago. [Figure 1](#) from physical examination, patient was diagnosed having mild head injury with infected open fracture at mid-facial third. Primary and secondary survey examination showed no significant finding. Clinical examination showed several findings such as, facial asymmetry, maxillary bone discontinuity or floating jaw. In extraoral examination there was localized

swelling at left cheek area which extended to left palpebra with tender consistency and positive fluctuation, and debris. There was also subconjunctival bleeding on left eye, and N. VI paresis and post hecing wound at zygomatic and buccal region. Intaoral examination showed multiple laceration at oral mucosa. Complete blood test, thoracic x-ray examination, cervical lateral and also 3D head CT Scan examination was also conducted.

From the results of physical and supporting examinations, the patient was diagnosed with a LeFort I fracture, a left blow out fracture which resulted in anenophthalmic fracture, orbital rhyme fracture in the superior et. Inferior aspect, nasal bone fracture, type 2 palate fracture, cranial nerves VI paresis, dentoalveolar fracture, extraoral and intraoral laceration wound. Actions in the emergency room, patients given oxygen, infusion of ringer lactat, anti-tetanus injection. Taking microbial samples was done by tapping the pus, then the sample was sent to the laboratory for the bacterial culture and antibiotic resistance. After that, patients were given antibiotics and analgesics. Wound cleaning was done using gentamicin and nacl with a ratio of 1: 1. Pus evacuation from extraoral and intraoral open wounds. For the pus drainage pathway, the drain was placed on the intraoral left buccall part. The fractured tooth was extracted. Intraoral wounds were sutured using silk and extraoral wounds were sutured using nylon. Temporary fixation was carried out using the Inter Dental Wiring (IDW) of the maxilla and the patient was applied with the bartolin sling then the patient was transferred to the treatment room.

After being treated for 4 days in the inpatient room, the condition of the infection had improved, marked by reduced swelling and no fluctuations. Furthermore, [figure 5A-figure 5D](#) the patient was scheduled to undergo Open Reduction and Internal Fixation (ORIF) to treat LeFort I fractures, maxillary fractures and orbital fractures under general anesthesia. The patient was also consulted to the Eye Department for assistance in managing fractures in the middle third of the face involving orbitals. In addition, a planned operation was carried out, assisted by the Eye Department for improving the left orbital floor

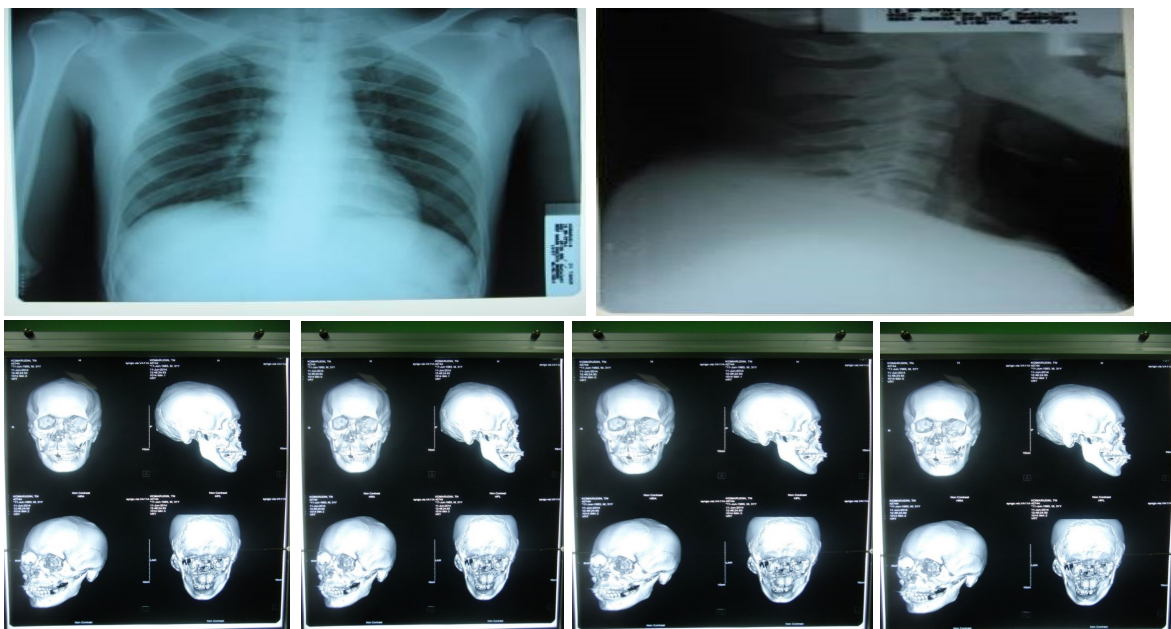
ORIF under general anesthesia was generally carried out by an intraoral approach with an incision made in the maxillary vestibule. The Erich Bar was installed on the mandible beforehand. Reduction of



**Figure 1** Extraoral findings: oedema at left cheek region extended to left



**Figure 2** Intraoral findings, A. Multiple lacerated wound and open fracture of maxilla bone, B. Malocclusion because of complete released from midfacial, C. Exposure of maxillary bone at upper vestibule.



**Figure 3** A. Thorax PA xray showed normal, B. Servical lateral x ray showed normal, C. CT Scan 3D showed multiple fracture of palate, bilateral maxillary bone, left sphenoid, left inferior orbital rims, bilateral zygomatic, bilateral of nasal, anterior, posterior and medial wall of bilateral maxillary sinus.







**Figure 5** Post treatment at emergency room, A. Tapping pus using 5cc spuit, B. Pus sample 2 cc sent to laboratory, C. Extraoral photo, D. Wood splinter that was found when wound debridement, extracted of tooth 42, E. Occlusion position post IDW with erich bar, F and G. Post suturing lacerated wound at extraoral and intraoral region, H. Panoramic xray before patient entered treatment room.



**Figure 5** Durante operation. A. Fixation of palate fracture using 5.0 wire, B. Fixation of right zygomatico-maxilla, C. Application of MMF rubber, D. Fixation of left zygomatico-maxilla. There was hose at 23 -24 vestibule region, where the balloon used to reduct the rupture orbital floor, E. Patient's condition at 7th post operative day: stable occlusion, F. Patient's condition at 60th Post operative day.

From the results of a Panoramic x-ray, an adequate bone healing was obtained. Clinical appearance of the patient's occlusion which is stable so that IDW Erich Bar could be removed.

**Figure 5F**, on the next day, the patient was fully conscious, and MMF rubber was installed to find a stable occlusion. The second day after the operation, a stable occlusion was obtained and MMF rubber was replaced with MMF wire. Henceforth, the patient was instructed to visit Cicendo Hospital Eye Department the following week for control.

## Discussion

The management of patients with fractures in the middle third of the face, including infected fracture at the orbital floor due to neglected conditions, is intended to relieve the infection in the first place. Both local infections and those that have become systemic inflammatory syndromes (sepsis) must be addressed first so that the patient's condition does not worsen and end up being life threatening. Therefore infection management is an emergency action that must be done immediately before definitive treatment of the fracture is carried out.<sup>1</sup>

Infections in these patients are suspected to originate from open and neglected unclean fractures in the midline part of the palate, then extend to the left buccal and left palpebral. Necrotomy debridement was performed to clean the patient's face from the remaining gravel and wood chips, as well as the evacuation of the pus and the installation of a rubber drain to allow the pus to keep flowing during infection treatment in the room. This is in accordance with the principles of infection management, which are eliminating the cause and drainage.<sup>1</sup>

Open reduction was done with internal fixation (ORIF) on this patient with an indication of malocclusion and mobilization of the maxilla. The surgery was approached through intra oral, then the fracture fragment was reduced to its original position. The miniplates and screws for fixation were installed on the left and right side of the maxilla. Wiring on the anterior nasal spine and the use of a balloon catheter inserted into the maxillary sinus and then inflated with a syringe containing NaCl fluid were done, aiming to reduce the orbital base that ruptures according to Choi et al.<sup>5</sup> had reported management of orbital floor fracture using a urinary balloon catheter, to prevent maxillary sinusitis, which may be caused by the remaining bony fragment, and to maintain the proper shape of the

inferior chamber. As the bony fragment itself is used for reconstruction of the floor, a donor graft is not required. Then MMF was installed for immobilization. MMF was maintained for 4 weeks, but every 1 week MMF was temporarily removed and infrared physiotherapy was performed to relax the muscles and prevent temporomandibular joint ankylosis. Teeth 11 and 21 located on the fracture line were maintained. Several studies reported in the journal also state that teeth on the fracture line can be maintained if there is no significant damage or mobility.<sup>3</sup>

The patient was instructed to keep taking liquid diet while at home to avoid masticatory burdens which can interfere with the fracture healing process. In the natural process of fracture healing, there are five phases, namely: hematoma, inflammation, callus, consolidation and remodeling.<sup>3</sup>

Examination and panoramic x-ray showed no bone discontinuity, the fracture segments were in contact and stable. From the examination on the 5th day postoperatively, the pus drainage was minimal, leukocytes and other lab results were within normal limits. The physical examination revealed good surgical scars, no dehiscence, minimal scar, symmetrical face and a drain installed in the left zygoma region. Orbitals were in the symmetrical position. Patient's occlusion was intact and stable. Furthermore, the patient was scheduled to have reconstruction on the depressed zygoma bone which got delayed due to infection (pus) in the zygoma area.<sup>4</sup>

## Conclusion

Management of surgical management in patients with open infected fracture in the middle of the face is the same as maxillofacial fractures in general, including proper diagnosis, wound cleaning and optimal use of antibiotics according to culture results, maintaining energy requirements during the healing process, reduction to restore the bone position to its original position, fixation on both bone fractures, immobilization during the healing and rehabilitation period to restore the deformity that occurs.

We report that the ballooning technique performed in this case was successfully carried out to reduce the ruptured orbital floor and yield good results. In addition, with this ballooning technique there is no infection in the maxillary sinus.

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## Conflict of Interest

The authors report no conflict of interest.

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