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The Cosmetic Considerations in Facial Defect Reconstruction

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<http://dx.doi.org/10.5772/52024>

1. Introduction

The 21st century is designated by the era of communication, multimedia, hi-tech gadgets and network connection programs that help people share the news, events, pictures and recent advancements throughout the world. The common denominator is the facial profile or image. Moreover, facial cosmetic advertisement, media, and products are taking big share of this phenomenon. Ad's usually display male and female individuals of variable age groups to assure reflecting the best facial and body figure toward the outer world. This goes hand-in-hand with the humanitarian beauty jealousy, the raised professional standards, the increase of sales managements and marketing business, the application of the quality management protocols in working environment, and the increase in self-satisfaction level and confidence. All the aforementioned issues raise the demand for facial cosmetics surgery and better quality of life. Thus, the new era of maxillofacial reconstruction had upgraded the concepts of management. The oral and maxillofacial surgeon may encounter severe panfacial trauma, severe maxillofacial tumors, abnormal congenital defects and secondary facial deformities that require extreme caution while constructing the surgical treatment plan. Such plan should provide the patient not only with better surgical outcome, but also improve the emotional self-satisfaction, family acceptance, quality of life, and easier re-integration into the working society.

Maxillofacial fractures are still a common cause of hospital admission for treatment all over the world [1,2]. Although major advancements in the safety of motor vehicles and traffic regulations traffic accidents (RTAs); are still a major problem in developing countries while alcohol abuse is the major stimulant associated with personal altercations [3]. It is well proved that most of the facial injuries do occur in the second to fourth decades of life, which is usually a studying or a working period in the individuals' life. Thus, although the concept

of reduction and fixation is the main pillar of treating facial fractures, it is still not enough. Facial cosmetics and esthetics are important considerations that merit attention; treatment of the fracture alone is not always enough. Many fracture are associated with facial defects (Figure 1).



Figure 1. An attractive 26 year- old female treated for a right orbital fracture and fixation through transconjunctival approach with lateral canthotomy. Although the results are very good she still feels that the palpebral fissure space on the right eye is smaller than the left eye. (Special gratitude to my colleague Dr E. Elizabeth, McGill University, Canada)

The same concept can be applied in managing maxillofacial defects secondary to large tumors resections. It is extremely common to have patients ask their physicians mainly about the “postoperative scar” rather than the outcome of the tumor resection margin which the treating physician spends a lot of time trying to explain [4]. Although that assuring total tumor resection and free margins can be the surgeons main nightmare in treating such large invasive tumors, restoring facial esthetics is a primary concern that might even change the treatment process accordingly, not to mention the importance of overall health status, safety of treatment, time and cost effectiveness. A thorough discussion of the treatment benefits, alternatives, and risks with the patient himself and the family is essential to construct the best treatment plan and options.

Tumors can occur in young or elderly individuals; each has its individual treatment concept with regard to restoring the quality of life. Younger ambitious individuals dream of full recovery and return to social life, while older individuals think of their family and their post-surgical facial image and how it will affect them and their offspring. Hence, a treatment plan for a 14 year-old girl suffering from invasive mandibular Ewing’s sarcoma will not be managed the same way as a mandible pathology in an 89 year-old grandfather. In this chapter, we will discuss some cases with variable facial defects that are treated considering the points mentioned. The cases presented were considered as severe in its category.

In the midst of all the surgical challenges, it is important to realize that achieving the combined goals is not always an easy task. Achieving full function, perfect occlusion and esthetics in a major referral center with a long waiting list of patients can be a busy surgeon’s biggest nightmare.

Case 1: Secondary upper lip deformity.

This is a case that discusses a secondary reconstructive operation for a known cleft lip and palate patient who is not satisfied with the results. A 22-year - old female patient treated for cleft lip and palate in various centers across the country. She came to our clinic with a complaint of deformed upper lip located more posterior than the lower lip. In addition, she did not like how her nose appeared. Clinical exam showed a thin upper lip, inverted, and located posterior to the lower lip. The frontal evaluation showed a thin flat upper lip, undefined white roll, uneven vermilion border, undefined cupid's bow and philtrum edges. Further, the lower lip showed more volume and definition. The nose was also deformed and in a very bad condition and displayed poor results of previous rhinoplasty procedures (Figures 2, 3). Several surgeons have met the patient and recommended midface augmentation and possible LeFort 1 osteotomy and advancement in order to correct the midface deficiency and give her nose some projection and upward rotation. The patient was afraid to go through this procedure and asked me if other treatment options can be offered to her. On clinical and radiographic investigations, it was apparent that the upper lip soft tissue disfigurement comprised a major area of the problem which a Le Fort 1 advancement alone may not be able to correct especially since the patient had an acceptable dental occlusion. Alternatively, the patient was offered the following surgical plan:

1. Upper lip lift and eversion chieloplasty
2. Abdomen fat transfer to the upper lip
3. Delayed reconstructive rhinoplasty and lip border definition

The patient agreed to the surgical plan, and the procedure was accomplished under general anesthesia. The flap design, W-plasty with asymmetric arms to reconstruct the deformed philtrum, philtrum edges, cupid's bow, and white roll alignment are shown in Figures 4-6. [5]. The patient had a flat asymmetric inverted lip, which made selection of the lifting direction more challenging. The underlying muscle layer was identified and resection of the planned W-skin was made. Minimal flap undermining was done in a caudal direction only and an attempt to evaluate the eversion movement was performed to assess the need of any further excision. After the chieloplasty was accomplished, fat was harvested from the right abdominal area and transferred to the upper lip and vermilion area. Over-correction was performed to compensate for the postoperative fat resorption. Polygalactin 90, 4-0 suture was used to approximate the subcutaneous tissue and nylon 6-0 suture was used to close the skin layer.

The operation went well and the patient was transferred to the ward the day of the operation and was discharged from the hospital in three days. She was prescribed antibiotics, analgesics, and a postoperative instruction sheet that include sun protection advice. The recovery period was uneventful. The postoperative figures showing the lip new look, which was well appreciated by the patient and her family.

Postoperatively the patient was seen and plans were made to pursue the secondary rhinoplasty in 6 months. However, the patient failed to refer for follow up as she got married and moved into another city.



Figure 2. Frontal view showing the severe upper lip inversion, loss of mass, flat architecture and loss of philtrum anatomy cupid's bow and tuberculum.



Figure 3. profile image showing the severe upper lip retro positioned, flat, and atrophic mass when compared to the upper lip, simulating a midface deficiency condition.



Figure 4. One day postoperatively showing the upper lip improved shape, thickness, and position in relation to the lower lip.



Figure 5. one day postoperatively showing the improved shape and thickness of the upper lip after the fat transfer graft.



Figure 6. days postoperatively

Case 2: Panfacial fracture.

This case, discusses a scenario where flap design should be planned in order to achieve multiple surgical objectives. Here it was prudent to use the primary laceration line, expose the fracture sites, and to obtain soft tissue lifting where needed. An 18 year-old female patient was a victim of a severe road traffic accident. She was admitted to the hospital for general systemic stabilization. She was cleared for operation about one month post-admission. Clinical examination showed right temporal degloving laceration that was sutured in the emer-

gency department. A drooping right eyebrow, and displaced zygomatic prominence into inferior medial position was apparent. The skin showed multiple abrasions of the right side of the face, periorbital region and cheek, which felt to be fibrosed, and fixed to the underlying tissue. The CT scan showed severely displaced right ZMC fracture into inferior-medial-posterior direction with displaced zygomatic arch fracture (Figures 7, 8). After discussing the case with the patient and her family, the plan was to extend the temporal degloving laceration into a coronal and pre auricular flap in order to expose the fractures and the zygomatic arch. Under general anesthesia, the patient underwent the planned flap design, and all the fracture sites were exposed successfully. Open reduction of the fractures and re-orienting the ZMC back to anterior-lateral-superior direction was accomplished concomitantly via fixating the zygomatic arch and facial fractures using plates and screws. Although fracture reduction and fixation was pursued to achieve symmetry with the contralateral side as much as possible, it was clear to the surgical team that soft tissue closure of a defect of such extent will not help the preoperative facial ptosis [6]. Hence, our approach was to give the right facial aspect some brow and facelift through the opened flap. The procedure was attempted in two planes, a deeper plane to the border of the zygomatic prominence just deep to McGregors patch, using 3-0 polygalactin 90 sutures were used to resuspend the deeper structures in an upward and lateral direction. The second plane was more superficial and excess skin and subcutaneous tissue was trimmed and the face and brow were lifted with minor over correction compared to other side to compensate for postoperative fibrosis. The lifting procedure added approximately 30 minutes to the operating time, as the surgical plan and flap design was used simultaneously for common objectives. Final closure was attempted using 3-0 polygalactin 90 suture for the subcutaneous plane and staples for the skin. An external head ribbon dressing was applied to support the lifting procedure (Figures 9-12). The patient returned to the ICU and stayed in the hospital for 4 more weeks before leaving into a neurological rehabilitation center.

The patient was seen couple of months later and the lifting procedure showed acceptable facial symmetry, although she will require further skin rejuvenation procedures for the skin abrasion wounds.



Figure 7. Frontal view of panfacial fracture on day 6 after trauma.



Figure 8. Preoperative 3D CT scan simulation showing the right ZMC complex displaced fracture.

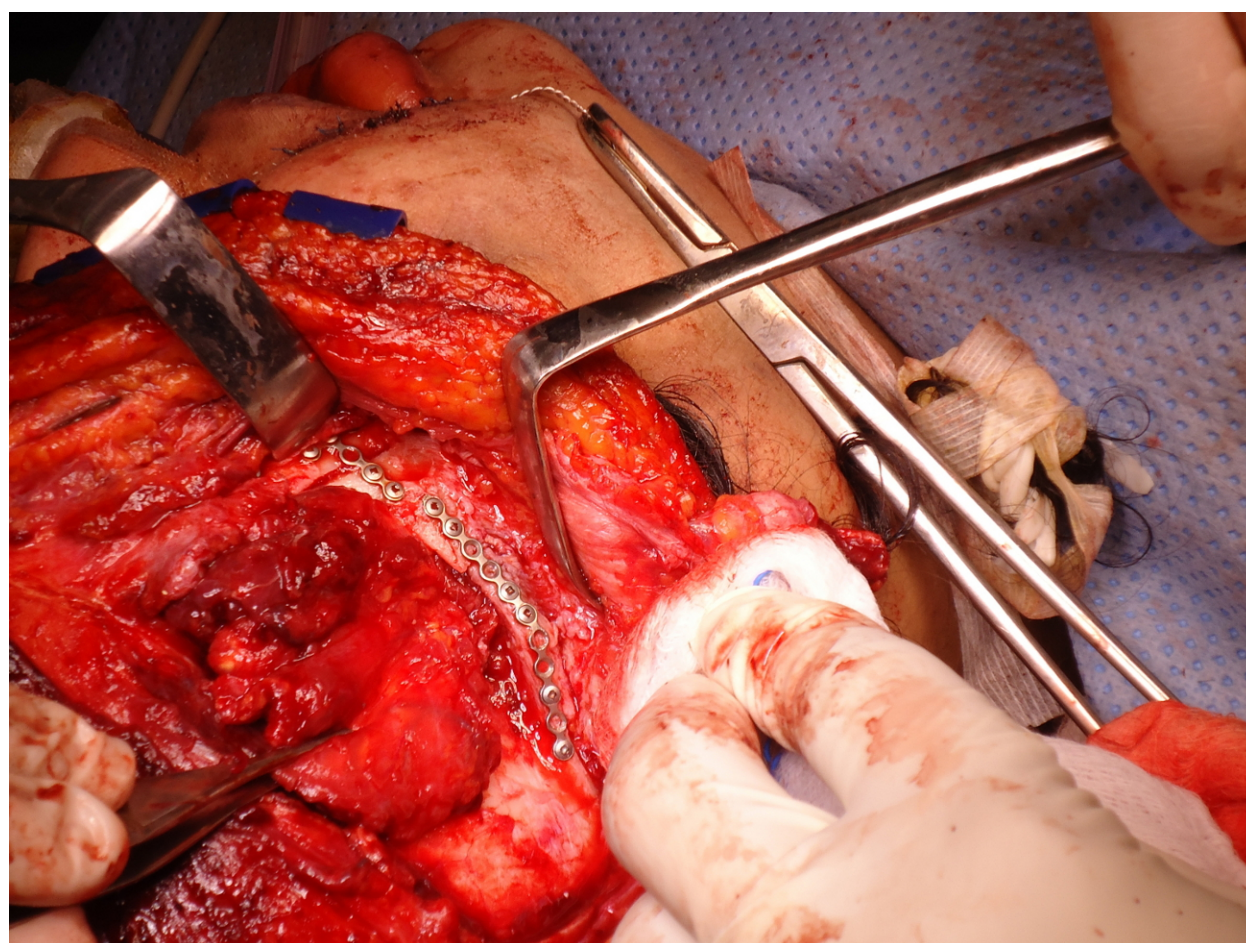


Figure 9. clinical intraoperative figure showing zygomatic arch reduction and fixation.

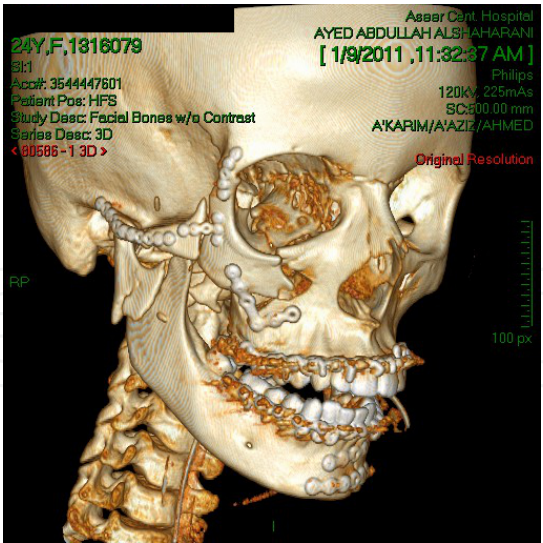


Figure 10. A postoperative 3D CT simulation image showing the perfect fracture reduction and fixation, however, soft management was still needed to optimize the clinical results.



Figure 11. Right eyebrow overcorrection to compensate for future reduction.



Figure 12. Right periorbital scarring.

Case 3: Atrophic mandible fracture secondary to anterior implant placement.

This case discusses the importance of evaluating the skin type and architecture before attempting a transcervical approach to the mandible. Although the intraoral approach does have the advantages of avoiding scar, avoiding the risk of facial nerve injury, and less emotional impact on patients, it is not inapplicable in all cases. Hence, case selection is the main factor to consider to pursue the approach [7]. A 77 year-old female patient came to our clinic after having five anterior dental implants placed in the mandibular interformanial area. Her chief complaint was pain at the right first premolar implant site. The patient had her implants placed 4 days before sensing a crack while eating using her provisional denture. Her clinical and radiographic investigations showed that she had a compound displaced atrophic mandible fracture at the implant site. The patient had a thin overall body architecture and thin skin – subcutaneous envelope in the head and neck region. The elasticity of the skin showed slow return on snap elasticity test. Usually the treatment of atrophic mandible fracture is through a transcervical incision for sufficient exposure and manipulation. Drawbacks of transcervical approach include risk of injury to the marginal mandibular nerve, unesthetic scar, and risk of transcutaneous fistula in elderly patients. However, considering the body and skin quality of the patient, an intra oral approach was considered to mainly reduce the chances of unesthetic scarring, and transcutaneous fistula.

The procedure was explained to the patient and she expressed total interest in avoiding the transcervical approach. An intraoral approach was performed as anticipated and sufficient access for plate fixation at the symphysis and parasymphysis areas while a transbuccal trocar access was used for plate fixation of the body and angle. The incision was placed at the crest of the mandible with two distal vertical releases to elevate a fullthickness flap. The mental nerves were identified and protected throughout the procedure. Re-

duction and fixation of the fracture was done using 2.4 locking plate and screws. To prepare for closure, the flap at the lower lip side was undermined to achieve tension free approximation at the anterior segment. The mentalis muscle and flap were then reapproximated using 3-0 polygalactin 90 suture. An external dressing was placed on the chin and used for 2 weeks (Figures 13-18).

Postoperativeradiographs showed adequate plate and screw positioning. The patient was started on clear fluid diet and was discharged from the hospital on the third postoperative day. At the 1.5 year follow up visit showed cosmetic facial results and the patient is satisfied with the results of treatment.



Figure 13. Panoramic radiograph showing the mandible fracture site at the right body region at the right premolar site.

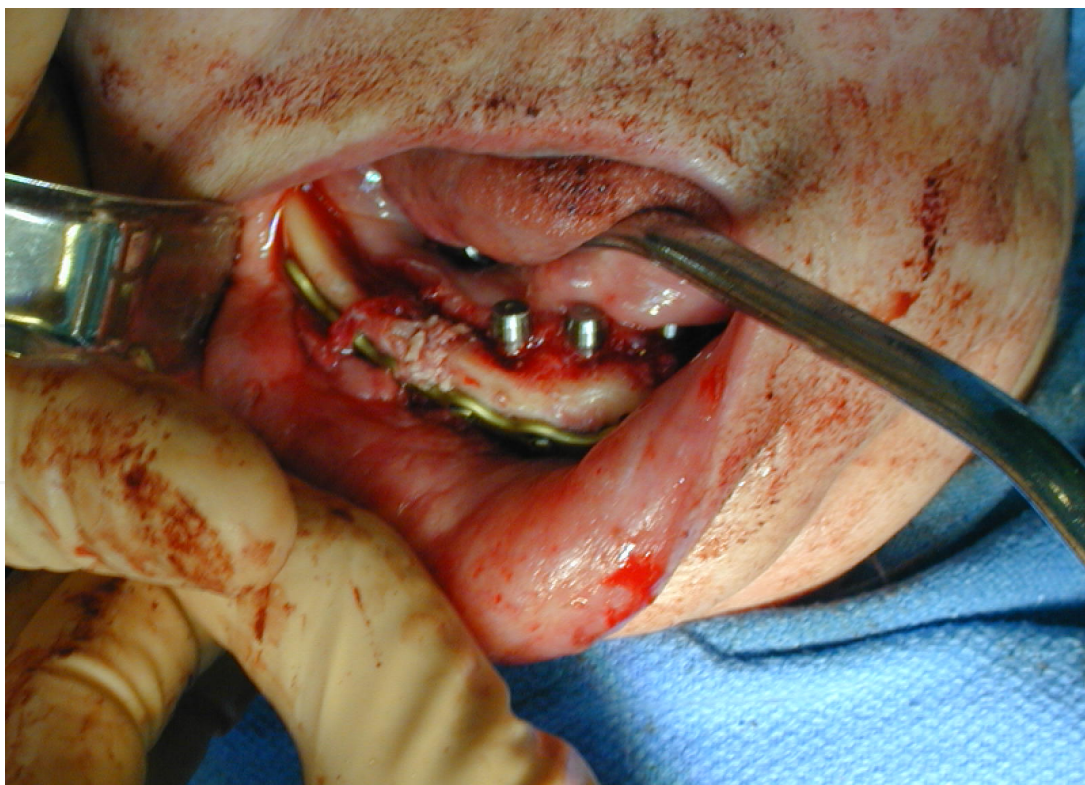


Figure 14. Reconstruction plate is in place and the fracture gap grafted with autogenous bone. Note the integrity of the mental nerve.



Figure 15. AP radiograph showing the reconstruction plate in place and the challenging screw position in between the implants.



Figure 16. A lateral cephalometric radiograph showing the reconstruction plate in place at the most inferior border of the severely atrophic mandible.



Figure 17. 5 weeks postoperative occlusal picture. Showing good closure of the wound all over including the previously dehiscent site on the left implants area.



Figure 18. A clinical picture of the cervical region 3 months postoperatively showing cosmetically acceptable neck area that was not affected by the surgical intervention.

Case 4: Bilateral cleft lip and palate with severe displacement of the premaxilla in a 17 year-old female (Figures 19-24).

This case shows a rare case of severe facial disfigurement secondary to neglected cleft lip and palate (CLAP) management from birth to the age of 17. This 17 year- old female patient referred to our clinic complaining of her facial deformity that negatively affected her social life and education to such an extent that she had to stop going to school. On clinical and radiographic examination, the patient had bilateral CLAP with severe (3.7cm) premaxillary displacement in an anterior and inferior position. She reported she had not sought professional medical help during the past 17 years of her life [8]. As the facial reconstruction team had to deal with a severe CLAP facial disfigurement in an older patient, the surgical plan mainly focused on accelerating the possibility of having this girl reintegrating back into social life and continuing education. Hence, it was planned to surgically reposition the premaxilla and repair the cleft palatal severe defect concomitantly.

The patient was informed that further reconstructive surgeries such as revision chieloplasty, rhinoplasty, oral rehabilitation, and possibly orthognathic surgeries might be required in the future.

Under general anesthesia, the patient's wide cleft palate was identified and planned for closure of the uvula, soft and hard palate defect using full thickness total palatal flaps (V-Y pushback) and vomerian flaps concomitantly with premaxilla reduction and nasal septum flap management. The wide cleft palate was managed successfully and the protruded premaxilla/septum bone was resected (2.9cm) in semi triangular shape to help in repositioning the premaxilla in back-upward direction. The nasal septum had to be trimmed conservatively and the premax position was secured using 4-0 Prolene sutures fixated at the bony segments of the palate and premaxilla. Minimal gengivo-periosteoplasty adhesion was made at the proximal segment to aid in retaining the new position in tension free fashion.

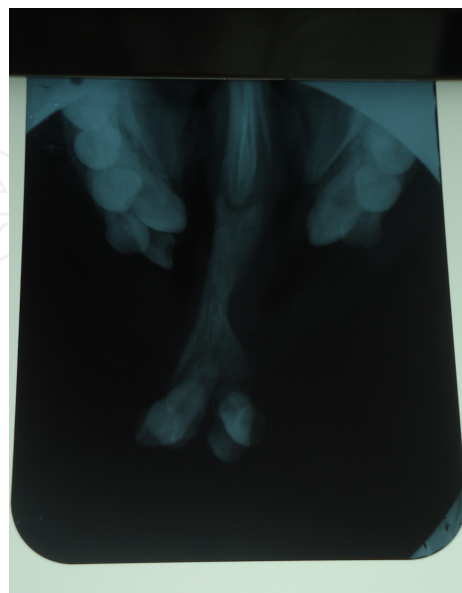


Figure 19. An occlusal view showing the severe premaxilla displacement.



Figure 20. Lateral Profile view.



Figure 21. Frontal view.



Figure 22. Lateral occlusal view.



Figure 23. One week postoperative profile picture showing that the premaxilla is now enclosed back inside the oral cavity after resecting about 2.9cm of the protruded premaxillary bone and nasal septum reduction.

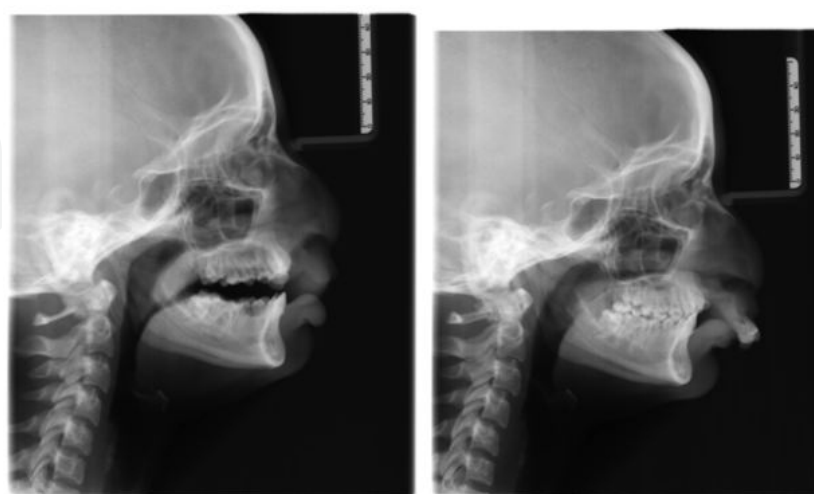


Figure 24. Lateral cephalometric showing the difference between the preoperative position (right) and on the post-operative reduced position (Left).

Case 5: Severe orbital vertical dystopia.

A 20 year- old male patient referred complaining of severe unesthetic vertical dystopia. The patient had a history of RTA few months ago and was in the ICU to control his unstable systemic status. Maxillofacial surgeries were not attempted for him at that time. Clinical examination revealed right orbital vertical dystopia of about 2cm inferiorly, fibrotic skin abrasions at the nasoorbital ethmoidal region, at the cheek, forehead, and lateral orbital regions. Due to the aforementioned, the patient was off school for one year since the patient planned to pursue facial reconstruction before enrolling back to school. Radiographic interpretation revealed orbital floor fracture and inferior displacement into the maxillary sinus by 2cm. ENT consultation was done and interpreted normal functioning status of the maxillary sinus. Management of such cases is challenging since the deformity is secondary to untreated displaced facial fractures a year ago and all the fractures have healed in abnormal alignment pattern. Furthermore, the soft tissue was deformed due to malunion and poor skin texture due to the scarring. The surgical objective was to alleviate the unesthetic vertical dystopia using a block of nonvascularized bone from the anterior iliac crest to support the eyeball superiorly, realign the inferior orbital rim which was posteriorly displaced, lift the right brow upwards and laterally, and canthoplasty for the deformed lateral canthus. Under general anesthesia, a transconjunctival incision with lateral canthotomy was performed to expose the inferior orbital rim and displaced orbital floor [9]. Elevation of the eyeball was attempted and the space of the supporting block was prepared. A second team was harvesting the anterior iliac crest bone graft, which was trimmed and sandwiched under the eyeball with consideration to reconstruct the inferior orbital rim and anteroposterior defect. Next, canthopexy of the lateral canthal tendons was done in a more superior position to compensate for the traumatic inferior displacement. The brow was lifted using the scar revision incision at the superior orbital rim area. (Figures 25-29) Follow up visits were uneventful and showed significant improvement and patient satisfaction. The patient is still planned for further reconstructive surgeries and skin rejuvenation procedures and he is already enrolled back to school.



Figure 25. Right orbital inferior vertical dystopia.



Figure 26. CT 3d simulation showing the magnitude of the inferior right dystopia.

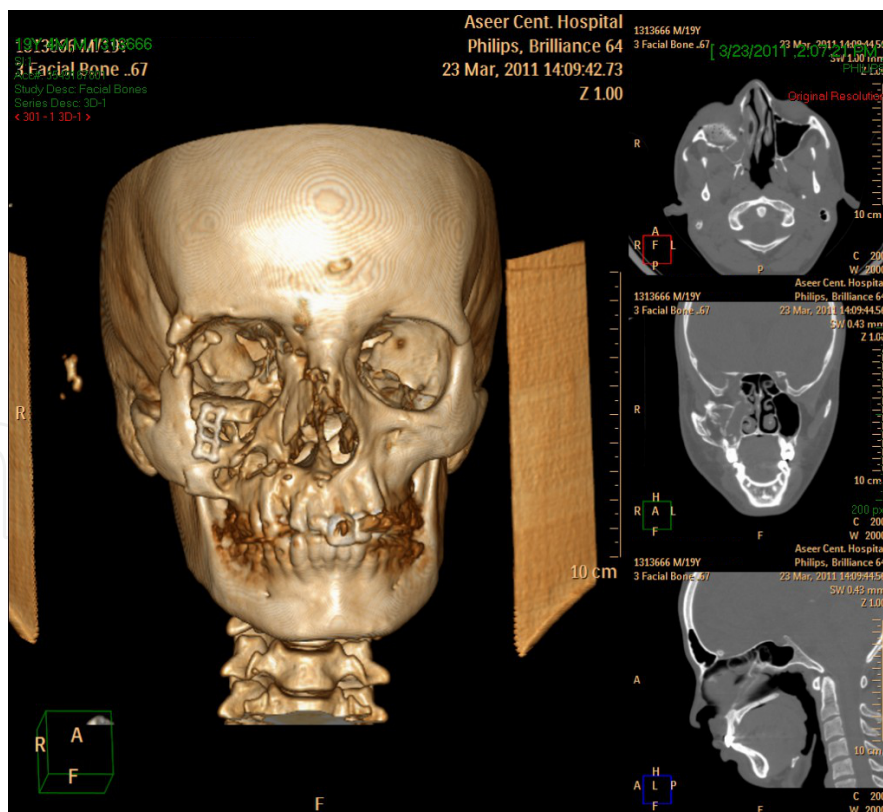


Figure 27. Postoperative 3D CT simulation showing the magnitude of right inferior orbital rim and floor elevation using a non vascularized bone graft from the anterior iliac crest.

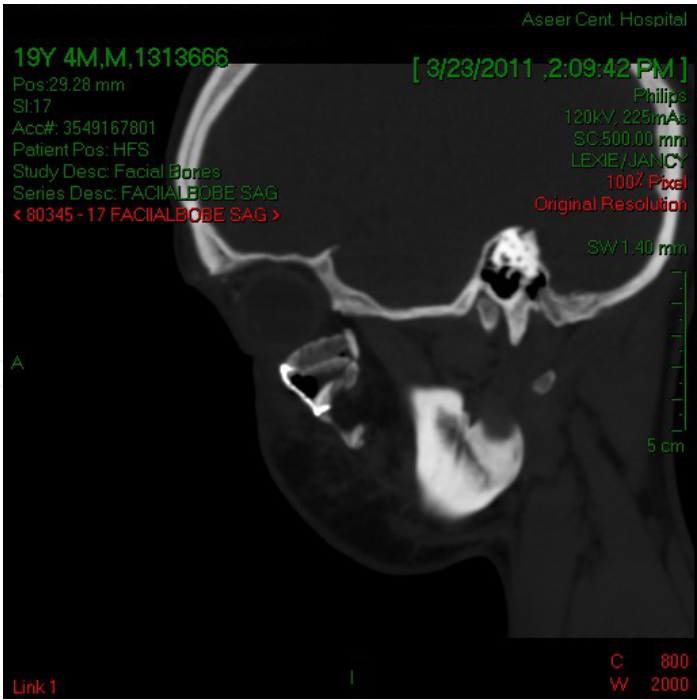


Figure 28. a postoperative CT scan of parasagittal cut showing section of the graft material that is elevating the eye ball back into the orbital cavity.



Figure 29. The left view is the preoperative view showing the vertical dystopia while the right showing the postoperative correction of the dystopia and brow lift, as the first stage of treatment. Further corrective surgeries are planned.

2. Conclusion

This chapter presents five cases with facial deformities that are considered “severe”. All five cases share the fact that facial esthetics was a significant consideration in the plan of management. Planning the flap design, hard tissue management, and soft tissue management are the basic pillars of treatment. As each of the three pillars of facial reconstruction contribute to the surgical procedure, equal attention should be paid to each. The aim of this chapter was to high-light the importance of this issue in treating oral maxillofacial patients.

Acknowledgements

The author would like to thank Dr. Morai Alqahtani and Dr Bader A. Raouf (Plastic Surgery Department, Saudi Arabia) for their assistance and support towards the Maxillofacial Surgery and Reconstruction Department, Dr Tord Lundgren (Periodontics surgery – USA, Sweden / Saudi Arabia) and Dr Ibrahim Zabani (Anesthesia – Saudi Arabia) for their help in solving the obstacles for treating the facial deformity patients, Dr Joe III Nimatu (Richmond, Virginia, USA) for his continuous insights in the field of facial cosmetics, my deep gratitude to the higher management of Umm Al Qura University – College of Dentistry for the strong support to the field of research, and last but not least “my family; Najiah, Ghena, and Ibrahim” in the beautiful Jeddah city of Saudi Arabia for their patience and support throughout all the working hours outside as well as inside home, thank you all.

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