Staged correction of facial asymmetry: A case report

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Abstract

Management of the facial asymmetry requires meticulous clinical and radiologic assessment to assess which bones are at fault. Correction of advanced cases may require surgically addressing occlusal cant deviation with asymmetrical impactions or down-grafting of maxilla, an asymmetrical rotation of mandible using either bilateral sagittal split or other ramus osteotomies and correction of residual chin deformity with a genioplasty. This may be accomplished within a single stage or stacked in a multi-staged plan. This is done in conjunction with orthodontics. Presented here is a case report of a post-pubertal young male patient with a skeletal class III profile, lower third facial asymmetry, occlusal canting and chin deviation.

Introduction

Facial asymmetry due to asymmetric growth of mandible can result from a range of causes, including developmental, congenital, traumatic, and neoplastic causes. Correction of complex cases may require surgically addressing occlusal cant deviation with asymmetrical impactions or down-grafting of maxilla, an asymmetrical rotation of mandible using either bilateral sagittal split or other ramus osteotomies and correction of residual chin deformity with a genioplasty.[1, 2]

Such cases require a multidisciplinary approach of treatment involving primarily maxillofacial surgeons and orthodontists. The team must work in close collaboration in order to reach an optimum result.

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Diagnosis and Etiology

A twenty one year old male, resident of Peshawar was seen jointly by the Orthodontist and Maxillofacial surgeon for surgical correction of facial asymmetry. The patient had once been seen before prior to start of the pre-surgical orthodontics. Objectives and plan for pre-surgical orthodontics were made. The patient had then his pre-surgical orthodontics completed. Detailed history of any causative factor for his facial disfigurement had revealed a history of trauma at seven years of age, after which according to the father they had started to notice an asymmetry on his face. His past medical, surgical and social histories were insignificant.

Extra oral clinical examination in the frontal plane (Fig1a) revealed gross facial asymmetry confined to the lower third of the face. Then chin was deviated to the right side with a relative 'fullness' on the same side and a relative 'flatness' on the contra lateral side. Though the patient had a chubby face which markedly masked the skeletal asymmetry, the chin deviation was still very prominent. Profile view showed a mild skeletal class III profile. Patient's intra-oral examination revealed lower midline rotation to right.

Patient's full post-orthodontic radiographic records were assessed to aid treatment planning. These included an OPG, lateral and frontal cephalometry.

Treatment Objectives

The treatment objectives for this patient included correction of the maxillary cant and rotation coupled with sagittal correction through mandibular surgery. Chin deviation was proposed to be corrected by asymmetric genioplasty. Septorhinoplaasty was a paramount objective to correct the nasal deviation.

Treatment Alternatives

The case was discussed along with the orthodontist in detail again. Two treatment plans were proposed. First was a single staged surgical treatment that included a Le fort I osteotomy with rotation and cant correction coupled with a bilateral sagittal split osteotomy. This was to be coupled with an asymmetric genioplasty to correct the residual chin deformity. The second plan was two staged in which during the first phase surgery, only a similar maxillary Lefort I osteotomy and a bilateral sagittal ramus split was to be done. This was to be followed by a six months gap following which the residual chin deformity was to be reassessed and corrected with an asymmetrical genioplasty. Patient also desired nose hump correction which was to be corrected with a septorhinoplasty at this stage, after settling in of the nasal base from the maxillary osteotomy. Keeping in mind the patient's higher expectations along with the unpredictable assessment of the residual chin deformity post mandibular osteotomies, the two staged plan was finalized. This plan was discussed in detail with the patient and he agreed with the second option.

Treatment progress

The patient was strapped up with Roth prescription 0.022 slot brackets. The plan was to complete the patient non extraction. Normal succession was followed with flexible Niti wires initially to level and align and later stiff stainless steel wires. The pre-surgical orthodontics went unremarkable with occasional breakages. After the completion of pre-surgical orthodontics patient's dental impressions were recorded and mounted on a semi-adjustable articulator. Model surgeries were performed to plan these movements. Interim and final surgical splints were fabricated for per-operative guidance.

After necessary preoperative workup, under hypotensive general anesthesia, a Le Fort I osteotomy was performed through the standard maxillary vestibular incision. Maxilla was downfractured and thoroughly mobilized to free any remaining attachments especially on the posterior lateral nasal wall, and the maxilla was fixed with four L-shaped miniplates with monocortical screws after cant correction with use of the interim splint to obtain temporary intermaxillary fixation using orthodontic elastic power chain on orthodontic bracket hooks. Overall, the maxilla rotated towards the left with net advancement. Wound was closed with running Polyglactin 910 sutures after nasal cinch maintenance and anterior V-Y closure. This was followed up with posterior vestibular incisions in the mandible to perform subperiosteal dissection and expose the medial ramus and lateral surface of the mandibular body. A Dalpont variation of sagittal split ramus osteotomy was performed, and using a series of osteotomes and bone spreaders, the mandibular angle region was split taking care of the inferior alveolar neurovascular bundle. On the right side, the impacted second molar was removed after the osteotomy, while the neurovascular bundle was seen to be trapped in the proximal segment. This was gently pried away with small fine osteotomes, and

Mitchell's trimmer. After ascertaining that the neurovascular bundle was intact, the mandible was placed into the final splint with removal of cortical bone from the proximal segment on the left side using orthodontic power chain. Cancellous bone was removed from the inner aspects of the proximal segment anteriorly from the left and posteriorly on the right to aid in complete union of the interface of the proximal and distal segments. The condyles were passively seated into centric relation and the osteotomies were fixed with one straight mini plate with monocortical screws on each side. The wound was closed with Polyglactin sutures and intermaxillary fixation was released. Occlusion was verified and after necessary measures the patient was extubated and shifted to recovery.

The patient was discharged on the second postoperative day on oral antibiotics and analgesics with acceptable swelling. The patient was given strict instructions on oral hygiene maintenance with use of Chlorhexidine mouth rinses and placement of light guiding elastics. The occlusion remained stable and the patient was asked to resume normal diet in six weeks post surgery.

The patient was reviewed once again about five and a half months after surgery to assess the residual chin asymmetry. The nose despite the cinch suture had started to show alar flaring. A low-dose 3D CT scan was advised and real time measurement showed chin asymmetry to be in the range of 6 mm.

After a joint consultation with the plastic surgeon for the nose deformity, the patient was operated again under general anaesthesia and chin was osteotomized and slight over correction was done to take the chin towards the left. The excess lower border on the left side was removed and was used as onlay bone graft with bicortical screws on the left sided body to enhance the relative 'flat-ness' in the body region. About 5 mL of buccal pad of fat was also removed from the right cheek. The plastic surgeon then performed an open rhinoplasty with correction of septal deviation and correction of alar flaring. Bilateral nasal osteotomies were done to infracture the nasal bones and reduce the bony base. Weir resection was done to reduce alar flaring and form the tip.

The patient was satisfied with his appearance except for continued 'full-ness' of his right cheek region. An option was given to augment further the left body region with alloplastic implants, but was not considered.

Results and Discussion

Correction of complex cases may require surgically addressing the problems. This may be accomplished with a single stage or stacked in a multi-staged plan. This is done in conjunction with orthodontics.[3,4] Facial asymmetry due to asymmetric growth of mandible can result from a range of causes, including developmental, congenital, traumatic, and neoplastic causes.[5] The correction of facial asymmetry poses a challenge to maxillofacial surgeons and orthodontists alike.[6,7] Though it remains preferable to correct the full facial asymmetry in a single staged procedure, it remains difficult in absence of a three dimension simulation and planning software, which can suggest and predict changes in both lateral and frontal planes. Even in the presence of such software, a CAD-CAM assisted model planning ensures a perfect outcome.[8,9] Due to the local unavailability of such software, we thus planned to correct the malocclusion and set the inter-maxillary relation right in the first operation. This enabled us to measure correctly the remaining chin discrepancy on a low-dose CT scan, which aided the chin to be corrected through the standard Genioplasty.[10] This also allowed us to cover for the remaining maxillary cant which was not corrected in the initial operation.

The aim of the pre-surgical orthodontics was to decompensate existing malocclusion, so that the resultant dental asymmetry is equal

in magnitude to skeletal asymmetry.[11] This allows the jaws to get into a harmonious inter-maxillary relationship when the teeth are set in maximum inter-cuspation.

Superior positioning of the maxilla in the form of maxillary impaction often desires intranasal procedures to be undertaken, to prevent premature contacts and buckling of the nasal septum.[12] The height of the nasal passages also gets reduced, which require inferior turbinectomy or atleast reshaping of the turbinates.[13] However, correcting the aesthetic nasal deformity might not remain completely predictable and this stage, and is best undertaken as a separate surgical procedure, about 6 months to one year postoperatively.[14] Extraction of the last standing maxillary molars (left third molar and right second molar) was discussed with the patient but since they did not seem to interfere with either the osteotomy or planned movement of the maxillary movement, they were left in situ. Due to patient's preference, their removal required another general anaesthetic, and would have made pterygomaxillary dysjunction complicated.

While planning an asymmetric mandibular rotation, attention must be paid to maintain the spatially correct position of the mandibular condyle in the glenoid fossa.[15] This means there are posterior bony interferences on the advancing side and anterior interferences on the set back side.[16] If an effort is made to have a complete anterior apposition of the cut bony ends, this might cause condyle-fossa malpositioning and cause postoperative relapse.[17] A number of measures have been proposed to prevent this 'torquing' of the condyle. We removed bone posteriorly from the advancing (right) mandible and anteriorly from the setback (left) mandible; from the proximal (condyle containing) segment. This allowed passive seating of the sagittally split segments without a need for excessive bending of the mandibular fixation plate. We preferred to extract deeply placed mandibular third molars (right second molar in this case) at the time of mandibular surgery, since it avoids another traumatic operation for the sole purpose of tooth removal in addition to avoidance of waiting time. We contend that it does not increase the risk of unfavourable splits, if the split is performed carefully.

Correction of the chin in the transverse plane is a straightforward procedure following the conventional Genioplasty procedure.[18] However, the relative 'fullness' of the short (deficient) side and the relative 'flatness' of the long (excess) side poses a major problem. A worthwhile solution is to use the inferior mandibular body osteotomy; a form of extended Genioplasty to take the chin cut posteriorly to as back as the angle region.[19]

This is not always possible though because of an often inferiorly placed inferior alveolar canal containing inferior alveolar nerve and vessels. Another option is to use autogenous or alloplastic onlay grafts to augment the 'flat' side, but remains typically difficult to address the 'full' side, and to undertake selective bone removal. Our patient had a preference for the 'flatter' side, and though it was augmented to some extent with locally harvested bone graft, any additional augmentation procedures on the left side were not considered by the patient (Figures 1a, 1b, 1c). Worm's eye view clearly expresses the pre and post difference in the chin deviation (Figures 2a and 2b). Radiological depiction (Figures 3a, 3b, 4a, 4b) clarifies the sagittal correction.

Conclusions

Simulation software would have allowed these procedures to be done concomitantly by predicting transverse movements and changes more efficiently, but the deficiency was fulfilled by staging the procedure into two operations. The multi disciplinary approach enabled the surgeons to finish the case to an optimal result.

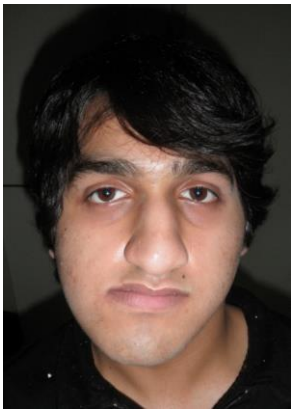

Figure 1a

Figure 1b

Figure 1c

Figure 1: Frontal view photographs of the patient, **1a:** After pre-surgical orthodontics. **1b:** After first stage surgery **1c:** at the conclusion of the surgical phase.

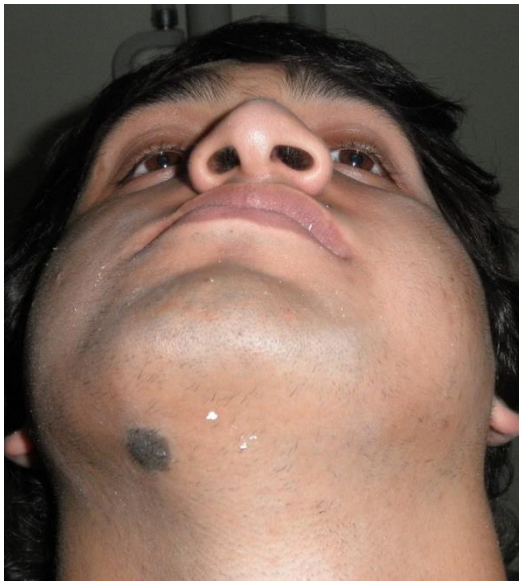

Figure 2 a: Worms eye view – preoperative

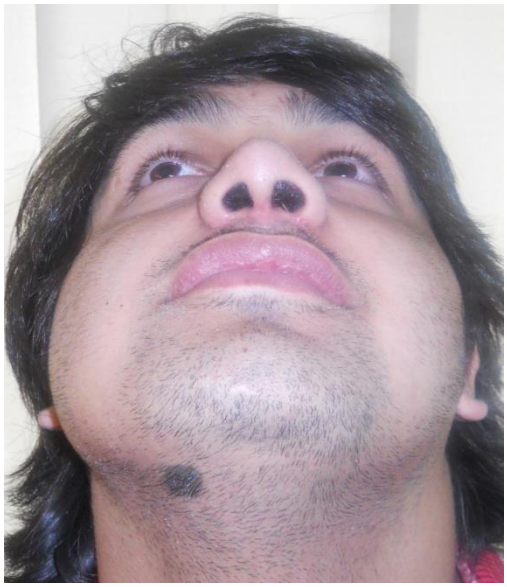

Figure 2 b: Worms eye view – postoperative

Figure 3a: Pre-surgical OPG

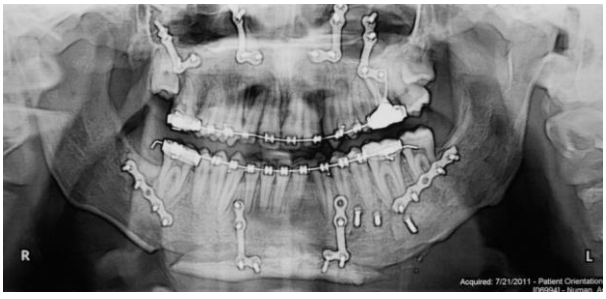

Figure 3b: Post-surgical OPG

Figure 4a: Pre-surgical ceph x-ray

Figure 4b: Post-surgical ceph x-ray

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