Rhinoplasty as an Adjunct to Orthognathic Surgery: A Review

Tian Ee Seah, BDS (Singapore), MDS (OMS, Singapore), FRACDS (Aus), FAMS (Singapore), Director[a,b,*], Velupillai Ilankovan, FRCS (Edin & Eng), FDSRCS (Edin & Eng)[c]

KEYWORDS

• Concurrent • Septorhinoplasty • Septoplasty • Turbinoplasty • Rhinoplasty • Orthognathic surgery • Maxillary osteotomy • Lefort I osteotomy

KEY POINTS

- The aim of simultaneous rhinoplasty and orthognathic surgery is to correct both dentofacial deformities and nasal deformities of the patients.
- Nasal deformities include inherent nasal deformities or surgically induced nasal changes.
- Challenges exist in assessing the nose accurately postmaxillary osteotomy due to surgical edema and temporary distortion of the nose from nasal intubation.
- Simultaneous rhinoplasty and orthognathic surgery can be carried out for patients with a high degree of satisfaction as it is a single operation, general anesthesia, and postoperative healing.
- Staged rhinoplasty can be performed for cases in which the surgeon feels that simultaneous rhinoplasty is not suitable.

INTRODUCTION

Orthognathic surgery (OGS) is an established and recognized method to correct dentofacial deformities.[1] One of the goals of OGS is to exhibit improved soft tissue change, reflecting the optimal correction of the maxilla and mandible. This positive soft tissue change is the result of improved midface support, paranasal areas, nasolabial angles, and proportion of upper lip to lower lip contours. Ultimately, there is a significant improvement in the patient's postoperative facial profile, esthetics, and function.

The nose is integral to the face. In OGS, particularly maxillary surgeries, the nose plays a critical role in determining its final nasal esthetics. The Le Fort I osteotomy is the most frequently performed maxillary osteotomy in orthognathic surgeries. Soft tissue changes to the nose which are attributed to the maxillary movements have been well documented.[1–4] Depending on the preexisting nasal characteristics, these acquired effects can be favorable or unfavorable.

Unfavorable nasal results can happen despite careful planning and execution in placing the maxillomandibular structures in their correct relationship. Such undesirable nasal effects can eclipse the positive results from the bony correction and can be upsetting to both the patient and surgeon. This is more so when the preoperative nasal characteristics seemed to be favorable before the OGS.

NASAL CHANGES FROM MAXILLARY MOVEMENT

Widening of the alar base is a common sequela of Le Fort I osteotomy because it entails circumvestibular subperiosteal dissection, an incision that causes the release and splaying of the facial musculature from

[a] TES Clinic for Face and Jaw; [b] Kadang Kerbau Women and Children's Hospital, National Dental Centre Singapore, Singapore General Hospital, Changi General Hospital; [c] Department of Maxillofacial/ Head and Neck Surgery, University Hospitals Dorset NHS Foundation Trust, Dorset, United Kingdom
* Corresponding author. 304 Orchard Road, Lucky Plaza Medical Suites #05-42, Singapore 238863.
E-mail address: stianee@yahoo.com

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the underlying bone.[2] There are several documented methods to reduce this effect, including nasal cinch,[3,4] V-Y closure,[4,5] or preservation of the anterior nasal spine.[2]

Other surgically induced changes in the nose are mostly vector-dependent. Maxillary impaction can cause superior positioning of the nasal tip; alar widening; retraction of the columella at the subnasal region; as well as a decrease in the nasolabial angle. Maxillary advancement can cause cephalic rotation of the nasal tip; increased supratip depression; and shortening of the nasal tip and alar widening.[1,6] The resulting effect is an increased nostril shown with a widened and shortened nose. Maxillary down graft can cause inferior repositioning of the alar base and columella. A maxillary setback can cause droopy nasal tip lobule with decreased support for the nasal tip.[1,2]

Nasal morphology and deformities should be carefully recorded during a clinical examination. It is important to take photographic records, including frontal, profile, oblique views; worm's view and bird's eye view. Where indicated, a computed tomographic (CT) scan, cone-beam computer tomography scan, or a nasoendoscopy should be carried out.

Nasal deformities can be classified into (1) inherent nasal deformities that can be improved by OGS, (2) inherent nasal deformities that cannot be improved by OGS, and (3) nasal characteristics and deformities that can be worsened by OGS.

Nasal Deformities that Will be Improved by Orthognathic Surgery

There are nasal deformities that can be improved by maxillary surgery. Maxillary advancement and impaction can improve patients with mild nasal hump; droopy or ptotic nasal tip or a narrow alar base.[1,4]

Although maxillary advancement can cause a corresponding decrease in the nasal tip height, its superior rotation can improve the ptotic nasal tip and improve the profile of the nose. This is because the cephalic rotation of the nasal tip can result in (1) straightening of the nasal bridge in patients with a mild dorsal hump or (2) reducing the prominence of a mild nasal hump. Increased maxillary support at the piriform region from maxillary impaction and advancement can also result in widened alar width and this can be advantageous for patients with narrow alar bases. In patients presenting with maxillary asymmetry and corresponding septal deviation, correction of the maxilla asymmetry restores the anterior nasal spine to the midline. A mildly deviated septum can be corrected by releasing the perichondrium of the septal mucosa before the disjunction of the septal cartilage and vomer. Fixing the nasal septum to the corrected anterior nasal spine can improve the deviation. These corrections can be done via the Le Fort I approach.

Nasal Deformities that Will NOT be Improved by Orthognathic Surgery

Some nasal deformities cannot be improved by OGS. These are nasal deformities that will remain unchanged although the effects of the vector of the maxillary movement do not cause untoward effects on the nose.

These include nasal and severe septal deviations; wide nasal bridges; flat or shallow nasal dorsum; moderate to prominent dorsal hump; bifid or flat amorphous nasal tip; wide alar bases; and upturned noses with increased nostril show.[1,2]

Nasal Characteristics and Deformities that Will be Worsened by Orthognathic Surgery

Maxillary advancement is indicated for patients with moderate to severe maxillary hypoplasia. These patients may not present with nasal deformities but may, as a consequence of increased paranasal bony support from large maxillary movements, end up with a less esthetic nasal result. Large maxillary advancements will result in an increased cephalic rotation of the nose with increased nostril show and accentuation of the supratip break. There is also a corresponding decrease in nasal tip height as the nose splays laterally. The nasal bridge can also look comparatively shallower with large advancements.

Nasal deformities, such as a flat or shallow nasal dorsum; bulbous, amorphous nasal tip; wide alar bases; and upturned noses with increased nostril show can potentially look worse after large maxillary impactions and advancement because of the earlier mentioned reasons.

These include nasal deformities arising in syndromic patients, such as cleft lip and palate patients. These patients usually have unchanged or worsened nasal deformities due to large maxillary advancement.

In patients with moderate or large prominent dorsal hump, the dorsal hump may look more prominent with maxillary setbacks. Similarly, patients with the droopy nasal tip will lose further bony support in maxillary setbacks and down grafts resulting in a more ptotic nasal tip.

THE CASE FOR SIMULTANEOUS RHINOPLASTY AND ORTHOGNATHIC SURGERY

Seah and colleagues[1] retrospectively studied 75 Caucasian patients and found that 61% of the patients had mild to prominent cosmetic nasal abnormalities, whereas 19% of the patients had genial deformities. Despite the greater prevalence of patients with nasal deformities than chin deformities, they found that it was common to correct the chin simultaneously but not the nose. With the nose sitting at the prominent part of the face, the authors felt that it was ideal for the nose to be corrected concurrently to achieve a better facial profile and appearance. They suggested that simultaneous rhinoplasty and OGS should be considered for two groups of patients: (1) those with inherent nasal deformities and (2) those who acquired surgically induced nasal deformities from the OGS. They performed nine cases of simultaneous rhinoplasty and orthognathic over a year and found that there were no functional or esthetic complications.

In 1988, Waite and colleagues[4] published a case series of patients who underwent 22 septorhinoplasties and concurrent orthognathic surgeries. Among these patients, 15 cases were with concurrent bimaxillary osteotomies and 7 with isolated bilateral sagittal split osteotomies. The patients were followed up for at least 12 months. Among these patients, they found that 82% of their patients were pleased with their rhinoplasty results, whereas 94% of their patients were pleased with their jaw surgery. Further, 84% would recommend having both surgeries together, whereas 16% would consider a staged nasal surgery.

Waite and colleagues[4] found that rhinoplasty can compensate for unfavorable nasal changes from maxillary procedures. They suggested that patient selection is important for simultaneous rhinoplasty. They also considered patients to be suitable candidates for concurrent surgeries if (1) they have an average noticeable nasal problem and (2) have a reasonable understanding and expectations of the improvement. Other relative indications include morphologic deformities, such as (3) functional nasal septal deviations or deviations that have no significant functional issues. (4) Minor tip defects, such as an excessive amorphous or bulbous tip, can undergo simultaneous tip-plasty, whereas (5) prominent dorsal hump can be straightened or reduced concurrently.[7]

Raffaini and colleagues[2] have the largest cohort to date involving 250 patients who underwent bimaxillary osteotomies and concurrent rhinoplasty over a 9-year period. Like Seah and colleagues, they were also in favor of simultaneous correction of nasal deformities that remain relatively unchanged after OGS, as well as acquired nasal deformities. The authors acknowledged the challenges that existed in assessing the nose accurately after bimaxillary surgery and showed that these could be surmounted by both meticulous preoperative planning. In their large group of patients, all the patients were found to have good functional and esthetic outcomes. Their study found that 94% of the patients felt that they accepted rhinoplasty only because it was included in the single operation together with OGS strengthening the case for concurrent nasal and dentofacial corrections. This was in line with the findings of Waite and colleagues.

Posnick and colleagues[8] studied patients who underwent bimaxillary osteotomies, septoplasties, and turbinoplasties and found an overall satisfaction rate of 95%.

Costa and colleagues[9] performed simultaneous rhinoplasty, bimaxillary osteotomies, and functional endoscopic sinus surgery on 13 patients. They noted that the advent of rigid fixation had allowed concurrent rhinoplasty and OGS because it allowed the safe transfer of the nasal to oral intubation while limiting surgical relapse alluding to one of Waite and colleagues' observations.[4] In their study, they found that all the patients had good esthetic and functional results and were free of previous rhinosinusitis.

Sun and Steinbacher[10] retrospectively studied a group of 68 orthognathic patients who underwent staged or simultaneous rhinoplasty. Among this cohort of patients, 12 patients underwent simultaneous rhinoplasty with OGS of which 2 underwent bimaxillary osteotomies and 10 had mandibular surgeries. They reported patient satisfaction in the surgical results in both staged and simultaneous groups with no revisions needed at 1.5 years of follow-up.

Besides nonsyndromic patients, the paper by Kinnebrew and Emison in 1987 included patients with a plethora of syndromes showing that concurrent correction of nasal and skeletal structures can be done for this group of patients[11] Some of these patients had Binder's syndrome, Sainton syndrome, Saethre–Chotzen syndrome, and cleft lip and palate syndrome. Another case study by Seah[12] reported on the feasibility of correcting both the nasal deformity and jaw deformity on a cleft lip and palate patient who underwent bimaxillary osteotomies, genioplasty, and open septorhinoplasty in a single operation.

The advantages of simultaneous rhinoplasty and OGS include a single planning procedure and general anesthesia and postoperative recovery.[13] Infraorbital nerve temporary hypoesthesia, due to the Le Fort I procedure can also make recovery more comfortable for the patient.

SURGICAL APPROACHES

The choice of surgical approaches to the nose is often dependent on the type of nasal deformity to be corrected. The common approaches are closed rhinoplasty or open rhinoplasty.[1,2,4]

Closed rhinoplasty has been reported for correction of isolated dorsal hump reduction or mild saddle nose augmentation during simultaneous rhinoplasty and OGS.[2,4] This involves marginal or infracartilaginous incisions or intercartilaginous incisions. Intercartilaginous can gain direct access to the nasal bridge, whereas marginal or infracartilaginous approaches can gain access to the nasal tip as well as the dorsum. For an infracartilaginous incision, it can be further joined to a hemitransfixion incision to give improved surgical access. Alternatively, a separate hemitransfixion or Killian incision can be placed to give access to the septum if septoplasty is required. The benefit of closed rhinoplasty is the absence of a columellar scar, but the challenges include limited surgical exposure.

The open rhinoplasty method is preferred by some surgeons if tip refinement work is required. Raffaini and colleagues[2] reported in their retrospective study that 95% underwent the open rhinoplasty approach. Open rhinoplasty can be performed using an inverted-V, step incision, or V-incision at the narrowest width of the columella with extensions to marginal incisions. This allows excellent visualization of the nasal tip and the dorsum and is useful for complex refinement of the nasal tip. Its drawback is the presence of a columellar scar although this can be minimized with careful and meticulous closure.

The facial degloving approach is the third approach described by Kinnebew and Emision.[11] This approach was first published by Egyedi in 1974[14] and involves degloving the nose via circumferential intranasal incisions with sharp dissection on the subcutaneous plane over the alar cartilage rims. Dissection can be carried out in a subperiosteal plane to the nasofrontal region superiorly and maxilla laterally, which allows visualization of the nose, the maxilla, and the infraorbital rims.[15] Despite the improved visibility, authors cautioned against using this approach for mild nasal deformities because of the possibility of nasal stenosis attributed to the 360° incisions in the vestibular region. This can contribute to issues with tip definition as well asymmetric nares.[11]

SEPTOPLASTY AND TURBINOPLASTY

Septal deviation correction can be done via the Le Fort I approach after the down-fracture of the maxilla. This prevents another endonasal mucosal incision.[4] Seah and colleagues.[1] found that maxillary down-fracture allowed easier access to the septum.

Alternatively, the septal deviation can be addressed during septorhinoplasty either via an endonasal septal mucosal approach using hemitransfixion or Killian incisions or through an open rhinoplasty approach via a split-tip technique. In removing the deviated part of the septum, important considerations should be given to preserving at least 10 mm of the caudal and dorsal strut. The resected deviated septum can be further utilized as cartilaginous grafts. With regards to cases with severe septal deviation requiring subtotal cartilage reconstruction, some surgeons prefer to stage the procedure 6 months after the OGS.[2]

Turbinoplasty is not rhinoplasty per se but is part of nasal surgery and helps with improving the nasal airway in patients with hypertrophic inferior turbinates. Enlarged turbinates can be approached after the down-fracture of the maxilla. The nasal mucosa can be incised to gain access to the inferior turbinates, which can be partially resected. In the author's experience, hemostasis is better controlled when the mucosa of the tubinates as well as the nasal mucosa are sutured with a running 5/0 or 4/0 vicryl suture on a round needle.

MANAGEMENT OF DORSAL DEFORMITIES

Problems of the dorsum are likely because of height discrepancies or deviation of the dorsum.

Deviated Nose

Deviation of the nose can be corrected simultaneously with the correction of dentofacial deformity. The deviation may be because of the cartilaginous vault or the nasal bone. In cases where the deviation is the cartilaginous vault, the septum has invariably deviated and it may suffice to perform septoplasty. The use of spreader or septal extended grafts can further aid in its correction. If the maxilla has deviated, then correction of the maxilla will bring the anterior nasal spline (ANS) to the correct position. The inferior caudal septum can then be anchored to the ANS just before the maxillary mucosal closure.

When the nasal bony vault has also deviated, lateral and medial nasal bone osteotomies can be done with either an endonasal method or percutaneous method, or a combination of both. Care must be given to the maxillary bone plates and the osteotomes should not encroach on the plates (**Figs. 1–8**).

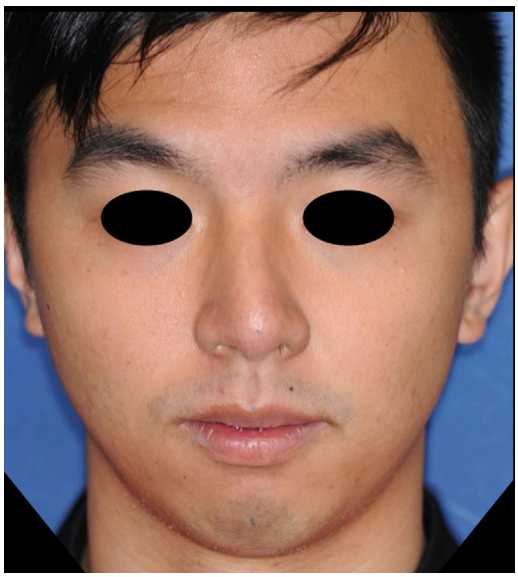

Fig. 1. Preoperative photo of a male patient with skeletal II relationship, maxillary cant and facial asymmetry, and a deviated nose (frontal view).

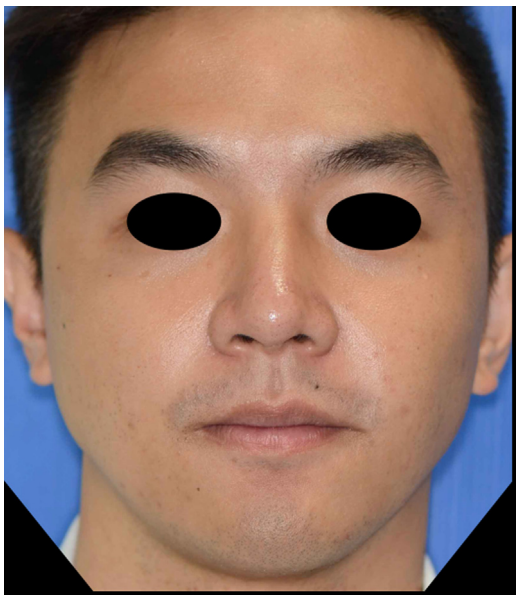

Fig. 2. Postoperative photo of a male patient after bimaxillary osteotomy, advancement genioplasty, and simultaneous open septorhinoplasty, including septal extended graft, columellar strut, onlay grafts, and medial and lateral nasal osteotomy. Improved facial proportions and facial symmetry and improved nasal symmetry (frontal view).

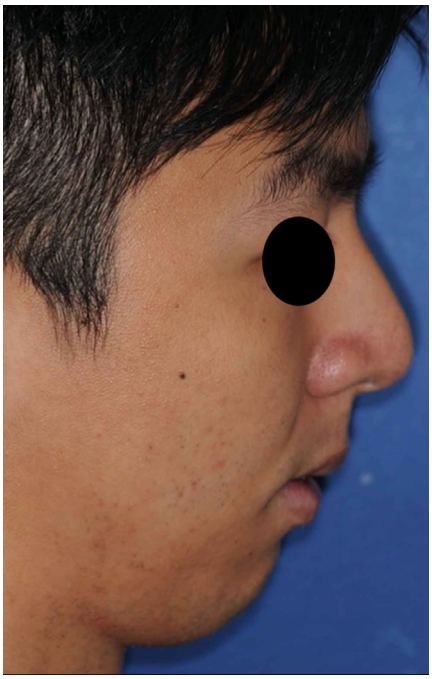

Fig. 3. Preoperative photo of a male patient showing deviated nose (bird's eye view). Preoperative photo of same male patient with hypoplastic mandible and retrogenia (profile view)

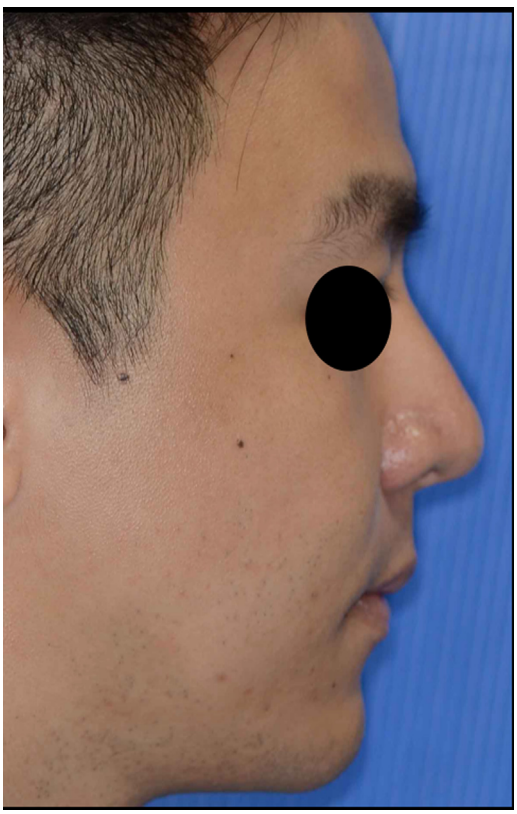

Fig. 4. Preoperative photo of a male patient showing deviated nose (worm's view). Postoperative photo of a male patient showing improved facial profile (profile view)

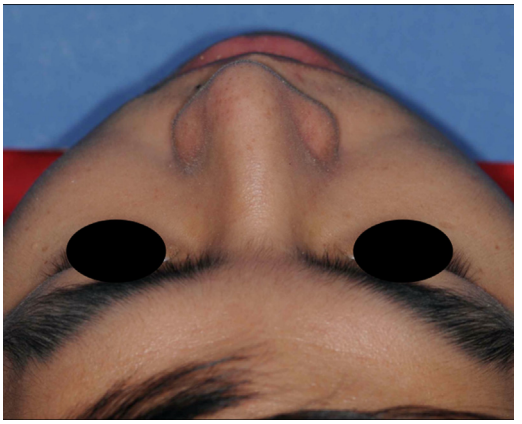

Fig. 5. Preoperative photo of a male patient showing deviated nose (bird's eye view).

Hump Reduction

In patients with high dorsum, simultaneous hump reduction can be performed. This can be carried either via closed or open rhinoplasty. Hump reduction can be carried out using an incision through the cartilaginous part to be resected followed by osteotomy using Rubin osteotome. After the appropriate reduction, a nasal rasp is used to smoothen the irregularities at the dorsum. When performed simultaneously with OGS, it is preferable to under-correct than to over-correct. Firstly, advancement and impaction of the maxilla can cause cephalic rotation of the nasal tip, which can make the dorsal hump less prominent thus requiring less reduction. Secondly, if tip-plasty is planned to increase nasal tip projection, then this should be taken into consideration when reducing the height of the dorsum. The reason is that the combination of excessive dorsal reduction and increased nasal tip projection can result in an accentuated supratip break.

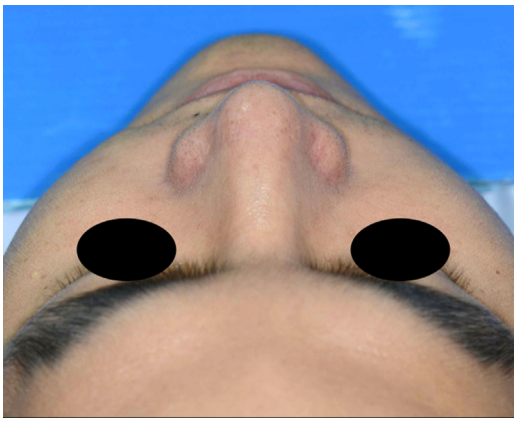

Fig. 6. Postoperative photo of a male patient showing correction of deviated nose (bird's eye view).

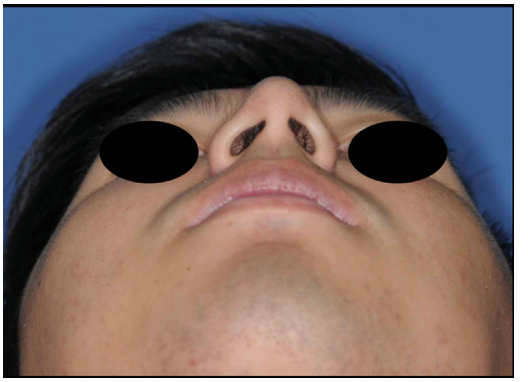

Fig. 7. Preoperative photo of a male patient showing deviated nose (worm's view).

Dorsal Augmentation

There is a dearth of papers that describe simultaneous dorsal augmentation and OGS in patients with shallow dorsum. Kinnebrew and Emison treated eight patients with dorsal augmentation using onlay graft to the nasal dorsum. Among these patients, seven patients used bone harvested from the iliac bone crest, whereas one patient had Proplast II (Vitek Corp, Houston) placed at the dorsum.[11] Waite and colleagues[7]. also described a patient who had a rib graft to augment the dorsum via infracartilaginous and transfixion approach.

Augmentation materials can include autogenous grafts, such as septal, conchal, and costochondral cartilage.[16] Alloplastic materials, such as silicone[16,17] or Gore-Tex (expanded polyfluoroethylene)[18,19] had been described in rhinoplasties and are popular in Asia. Augmentation of the dorsum can be safely carried out by using autogenous grafts or alloplastic materials with success in rhinoplasty. Although silicone and expanded polyflouroethylene's use in simultaneous rhinoplasty

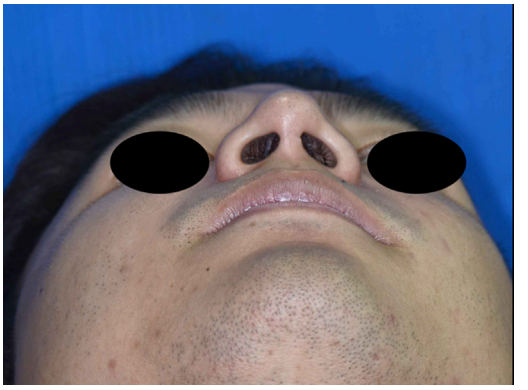

Fig. 8. Postoperative photo of a male patient showing symmetry of the nasal nares after septorhinoplasty (worm's view).

and OGS have not been described before, this is partly attributed to an absence of papers with regard to simultaneous rhinoplasty and orthognathic surgeries in Asian patients. The author has used these materials for dorsal augmentation in simultaneous rhinoplasty and orthognathic surgeries with success (Figs. 9–14).

MANAGEMENT OF NASAL TIP DEFORMITIES

Boxy Nasal Tip and Droopy Nasal Tip

Patients with a boxy nasal tip can undergo cephalic trim of the lower lateral cartilage to help reduce the boxiness. Patients with bifid tips will benefit from the placement of crushed cartilage in the interdomal region. Mild droopy nasal tip may be corrected by the advancement of the maxilla. However, if the nasal tip remains droopy, the cephalic trim of the lower lateral cartilage can help to rotate the nasal tip further in the cephalic direction.

Nasal Tip that has Inadequate Projection

Tip-plasty in the form of supratip or lobule grafts using cartilage and Proplast (polytetrafluoroethylene) had been performed by Kinnebrew and Emison.[11]

In patients with a flat nasal tip with inadequate projection, projection of the nasal tip can be gained by using a septal extension graft and columellar strut to increase the nasal tip projection. The septal extension graft, first described by Bryd and colleagues.[20] is a powerful method to increase nasal tip projection or to derotate the nasal tip. Further reinforcement of the projecting structure can be done by the use of columellar struts.[18] This sits between the lower lateral cartilage and the superior end is fixed to the medial crus of the lower lateral cartilages and the septal extension graft. The inferior end sits superior to the anterior nasal spine. Kinnebrew and Emison described the use of columellar struts using autogenous bone and cartilage when necessary.

If further tip definition and more projection of the nasal tip lobule are required, onlay grafts can be placed in the interdomal region. The authors secure these to the underlying lower lateral cartilages with 5/0 polydioxanone sutures These onlay grafts can be layered if the height is inadequate. Most of the time, conchal grafts or septal grafts are used for these purposes. The authors find that conchal grafts are particularly suitable for this area because it has a natural convex shape and forms the ideal nasal tip projection. Shield grafts can be further used to reinforce columellar struts and structural supports (Figs. 15–20).

Fig. 9. Preoperative frontal photo of a female patient with skeletal III relationship showing a flat and upturned nose with wide alar base (frontal view).

Fig. 10. Postoperative photo after bimaxillary osteotomy and simultaneous open septorhinoplasty, including septal extended graft, columellar strut, and layered onlay grafts at the nasal tip. Dorsum is augmented with Gore-Tex (expanded polytetrafluoroethylene). Alar base reduction (frontal view).

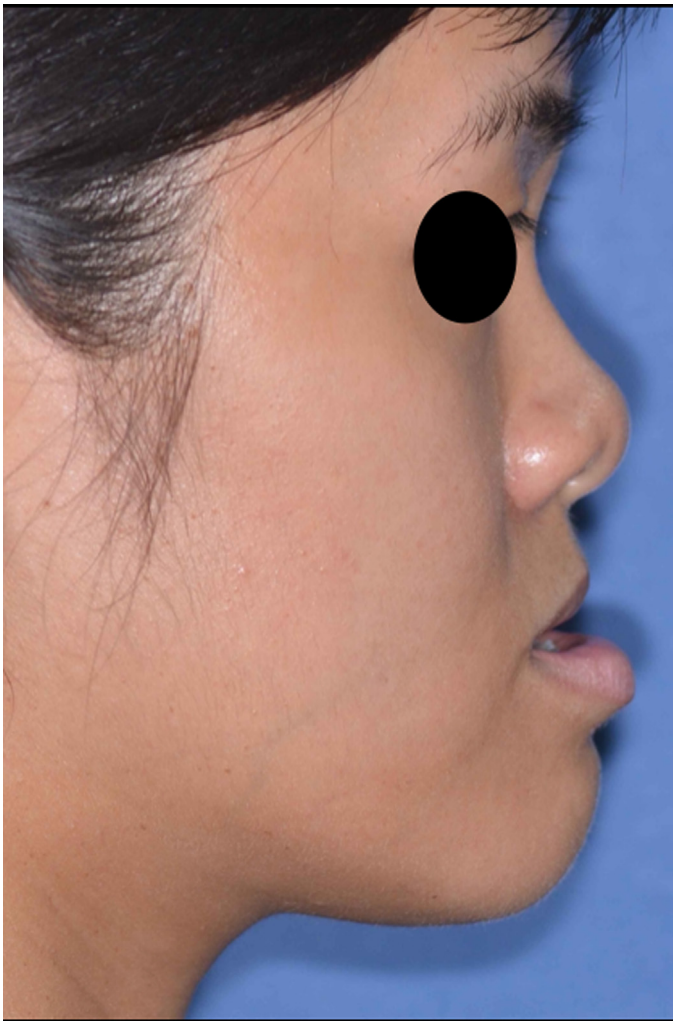

Fig. 11. Preoperative photo of same female patient with maxillary hypoplasia and mandibular hyperplasia. Saddle nose with short upturned nasal tip (profile view).

ALAR BASE DEFORMITIES

The alar base reduction can be carried out in two ways. In the first method, wedge excision or weir reduction can be done by carefully excising the alar rims and suturing them. The incision should be close to the alar crease for good scar formation. In the second method, alar base sills are excised in a diamond or trapezoidal shape at the vestibule of the nostrils to reduce the alar base. In the third method, a combination of wedge and sill excision can be done.

CHALLENGES AND LIMITATIONS TO SIMULTANEOUS RHINOPLASTY AND ORTHOGNATHIC SURGERY

Seah and colleagues.[1] classified challenges in simultaneous rhinoplasty with OGS under preoperative, perioperative, and postoperative considerations.

Preoperative planning is more challenging because the surgeon will need to predict the nasal changes arising from the maxillary movement. The surgeon thus has to be cognizant of these nasal changes with respect to the vector of the maxillary movement and may have to correct not only the inherent nasal deformities but also these nasal changes.

Perioperatively, challenges include surgically induced edema around the nose and paranasal regions, which makes an assessment of the post-maxillary osteotomy nose more difficult. Temporary minor nasal changes may also occur because of the pull of the nasotracheal tube. The surgeons will need to rely on their preoperative planning and not be distracted by the perioperative swelling or nasal distortion. Intraoperatively, tube change from nasoendotracheal to oroendotracheal will require an experienced anaesthetist.[1]

Postoperatively, nasal packs are usually placed postsurgically to reduce bleeding and prevent the

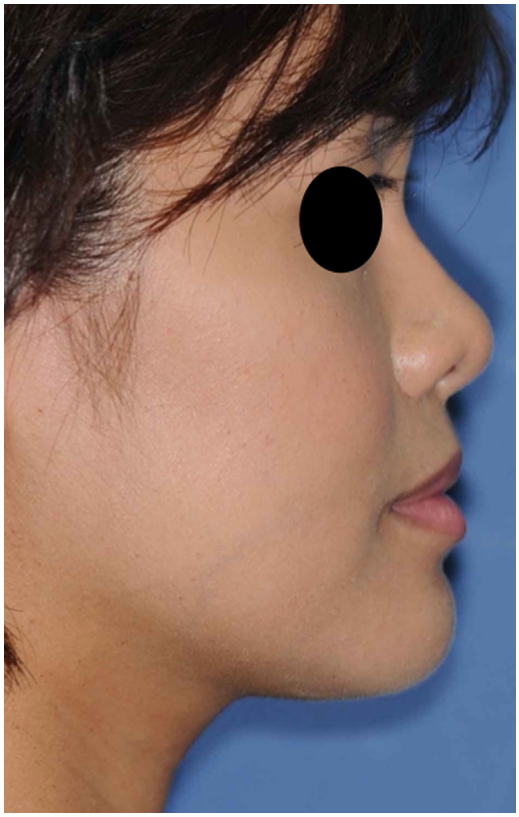

Fig. 12. Postoperative photo of a patient showing improved maxillomandibular relationship and improved dorsal height, nasal tip projection, and position (profile view).

Fig. 14. Postoperative photo of a patient showing improved facial contours and improved dorsal height, nasal tip position, and reduced alar base and acceptable alar base scar (oblique view).

Fig. 13. Preoperative photo of a female patient showing concave facial contours, incompetent lips, shallow dorsum, wide alar base, and upturned nose (oblique view)

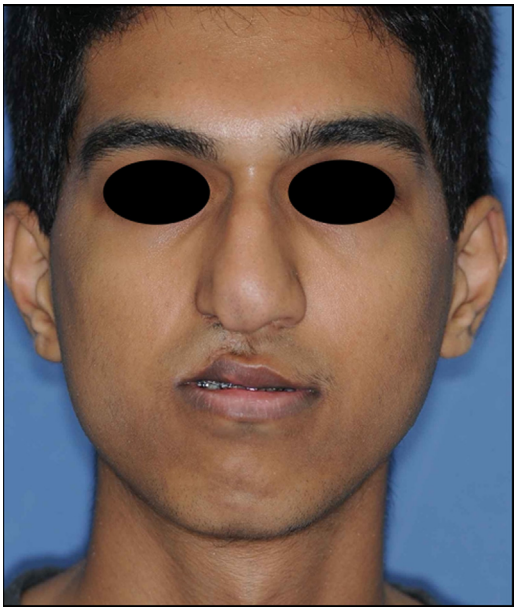

Fig. 15. Preoperative photo of a male right-sided unilateral repaired cleft lip and palate with maxillary hypoplasia and nasal asymmetry and bifid nasal tip (frontal view).

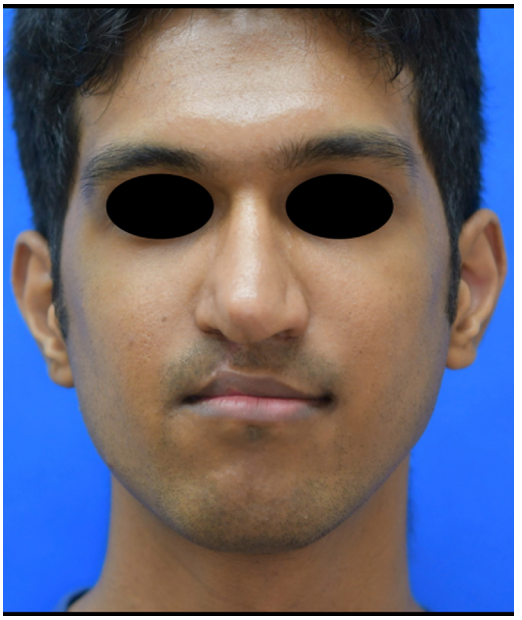

Fig. 16. Postoperative photo of a male after maxillary advancement and simultaneous open septorhinoplasty and right alar rim repositioning showing improved midface support and improved nasal symmetry and obliteration of bifid nasal tip (frontal view).

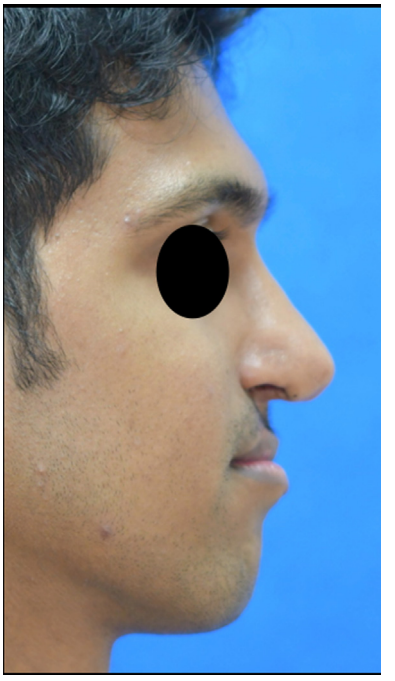

Fig. 18. Postoperative photo after Le Fort I advancement and open septorhinoplasty, including dorsal hump reduction, lateral nasal bone osteotomy, septal extension graft, columellar strut, and layered onlay grafts. Improved facial and nasal profile (profile view).

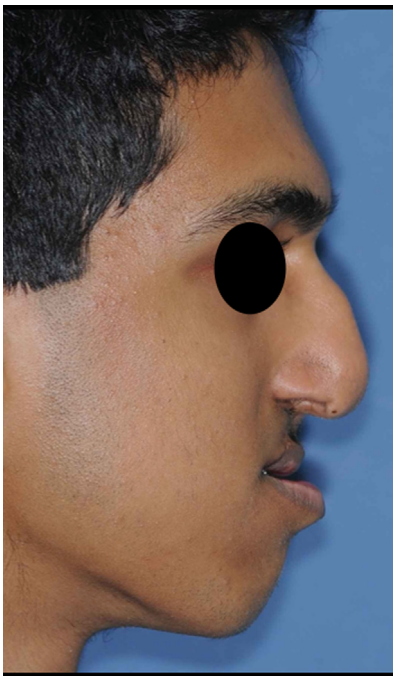

Fig. 17. Preoperative photo of same unilateral right-sided repaired cleft lip and palate patient with skeletal III relationship, prominent dorsal hump, and droopy nasal tip.(profile view).

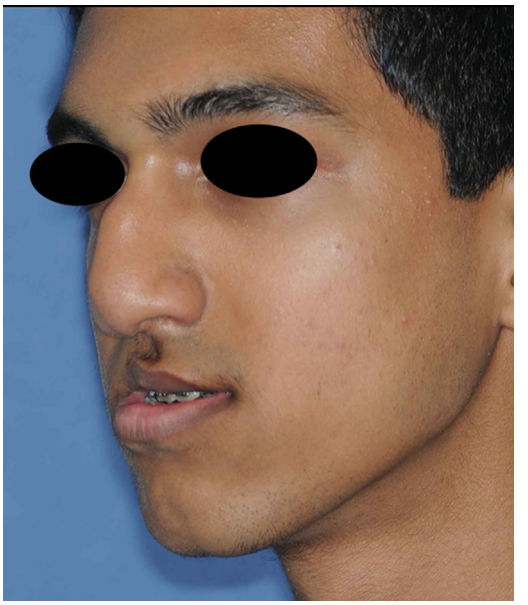

Fig. 19. Preoperative photo of the same unilateral right-sided repaired cleft lip and palate patient showing midface hypoplasia with prominent dorsal hump and incompetent lips (oblique view).

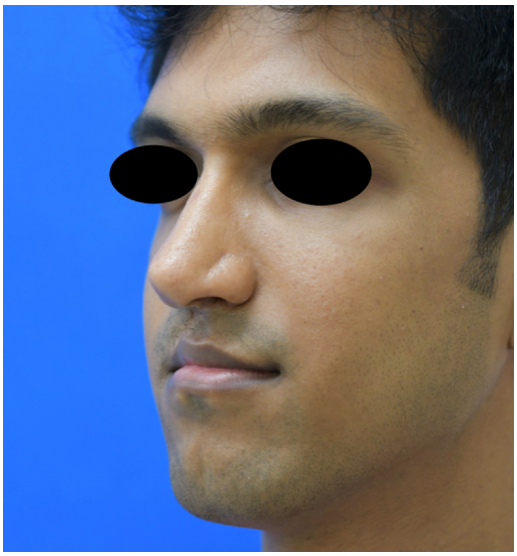

Fig. 20. Postoperative photo of patient with improved facial contours, straight dorsum, improved nasal tip position, and competent lips after simultaneous maxillary advancement and open septorhinoplasty (oblique view).

formation of hematoma, particularly at the septum. Hence, there is also a need for rigid or semi-rigid fixation because training elastics or elastic intermaxillary fixation can only be placed only after the nasal pack is removed; usually on the second postoperative day. In the rare event when unfavorable fractures occur during the osteotomies and intermaxillary fixation is indicated, rhinoplasty will have to be deferred. In such instances, rhinoplasty is usually staged as a second procedure 6 months later.

After the surgery, the patient may complain about periorbital swelling and ecchymosis caused by the rhinoplasty and nasal obstruction because of crusting of the dried mucus along the nasal passage. Placement of the external nasal splint may also be affected by maxillary edema. The use of Doyle splints post-rhinoplasty can be more comfortable for the patients and allow some form of nasal breathing.

Raffaini and colleagues described some contraindications to simultaneous rhinoplasty and orthognathic surgeries. Patients with major functional problems due to severe septal deviation, requiring subtotal cartilage reconstruction are contraindicated for simultaneous corrections. Staged rhinoplasty is also indicated when an unpredictable final occlusion is achieved during OGS. Finally, excessive intraoperative bleeding; compromised rigid fixation; and compromised airways preclude simultaneous nasal procedures. Most papers agree that staged rhinoplasty should be usually delayed at least 6 months.[2,10,21]

THE CASE FOR STAGED RHINOPLASTY AS AN ADJUNCT TO ORTHOGNATHIC SURGERY

Waite and colleagues.[4] recommended staging the rhinoplasty for complex maxillary osteotomies or in instances when the soft tissue cannot be predicted. They suggested avoiding treating extremes in the form of very mild and prominent nasal deformities and suggested that these should be staged.

Sun and Steinbacher[10] also looked at 56 patients who underwent staged rhinoplasty after OGS. In this retrospective study, they were more inclined to perform staged rhinoplasty in situations where (1) maxillary advancement is more than 5 mm; (2) there is more than 2 mm impaction, and if, (3) alar base reduction is indicated. Sun and Steinbacher also preferred to stage rhinoplasty for surgically induced nasal deformities and described a comprehensive list of techniques in the treatment of these different surgically induced deformities.[10]

COMPLICATIONS AND RISKS

Raffaini and colleagues found that the complication rate for nasal surgeries performed with Le Fort 1 ostetomy was 9.2% (23 patients), which was comparable to complications that arose from isolated primary rhinoplasty (6%). Complications included a single complication or a combination of complications. These included nasal dorsum irregularities; residual nasal septum deformities; nasal tip deformities; persistent respiratory limitations; and internal nasal valve collapse. The 23 patients subsequently underwent successful revision rhinoplasty for their deformities.[2]

Waite and Matukas noted in their paper that revision after simultaneous rhinoplasty should not be viewed as a failure as primary rhinoplasty frequently requires further modification.[7]

SUMMARY

The nose is an important consideration in OGS. It can be adversely affected by certain vectors during maxillary osteotomies. Proper case selection, knowledge of OGS, and the nasal changes that accompany various maxillary vectors are important. In-depth knowledge of various rhinoplasty techniques is paramount to correct specific nasal problems: inherent or acquired.

Simultaneous rhinoplasty and orthognathic surgeries have been published in various papers and have been proven to be viable solutions for patients who exhibit both problems. The advantages of simultaneous rhinoplasty and OGS include a single planning procedure and general

anesthesia and postoperative recovery.[21] Infraorbital nerve temporary hypoesthesia due to the Le Fort I procedure can also make recovery more comfortable for the patient. The most gratifying advantage of simultaneous rhinoplasty and OGS lies in the dramatic improvement of the patient's overall esthetics and function in a single operation.

In cases where concurrent rhinoplastic surgery is not suitable, the surgeon can stage it 6 months after the OGS. Revision of the nose after simultaneous or staged rhinoplasty should not be viewed as a failure because primary rhinoplasty frequently requires revision to achieve perfection.

CLINICS CARE POINTS

- It is important to examine the nasal morphology of the nose during the orthognathic planning and predict the possible nasal changes that will arise from the planned maxillary vector.
- There are some nasal characteristics that will be improved after maxillary surgery and rhinoplasty is not required for these patients.
- Nasal deformities that will not be improved or can be worsened by the maxillary surgery should be recognized and correction for these deformities should be planned.
- The surgeon should be cognizant of the unfavorable esthetic changes to the nose arising from certain large maxillary vectors, such as impaction or advancement and plan for its correction.
- There are various rhinoplasty techniques that can be used to treat various nasal deformities and the surgeon should be familiar with them.

DISCLOSURE

The author has nothing to disclose.

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