Lefort -2 osteotomy for the treatment of nasomaxillary hypoplasia: a case report

Preethi Bhat¹ ✉ · Cariappa KM²¹ Former Resident² Professor and HeadDept. of Oral and Maxillofacial Surgery,
Manipal College of Dental Sciences,
Manipal

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Abstract Nasomaxillary hypoplasia clinically presents as a class III deformity with hypoplasia or retrusion of the nasal bones and maxilla, which manifests as deficient projection of the nose. Lefort 2 osteotomy though introduced in 1950s, did not get its due attention till Henderson and Jackson published their landmark article, for the correction of Nasomaxillary hypoplasia in 1973. Accomplished surgeons can achieve a lot more in this rarely performed surgery when used in appropriate cases.

Keywords Lefort 2 osteotomy · Nasomaxillary hypoplasia

Introduction

Maxillary deficiency denotes inadequate bony development in the mid-third of the face at any level from the upper dentition to the orbits, and is usually taken in the wider context to include all mid facial deficiency below the cranial level [5]. While not strictly anatomical, this has the advantage of including the whole range of mid-third hypoplasias.

It is misleading to equate the levels of maxillary deficiency with Lefort fracture patterns, as deficient development may affect variable sites that do not correspond exactly with Lefort's classification of fractures, even though the lines of osteotomies have a general similarity to them.

Maxillary hypoplasias may be classified as

- a) Supra-apical maxillary hypoplasia
- b) Nasomaxillary hypoplasia
- c) Total mid facial hypoplasia

Intermediate forms also exist [5].

Nasomaxillary hypoplasia

This condition was described by Converse and colleagues as, 'Foreshortening and hypoplasia of the nose and the adjacent maxillary area' [1]. They proposed a pyramidal naso-orbital-maxillary osteotomy to correct the same (Fig 1).

Henderson and Jackson presented a landmark paper [3] in 1973 regarding Lefort – 2 osteotomy for the treatment of patients with nasomaxillary hypoplasia. They described four types of nasomaxillary hypoplasia in which this procedure could be used. They are

- 1) Nasomaxillary hypoplasia involving the dentoalveolar segment
- 2) Nasomaxillary hypoplasia excluding the dentoalveolar segment
- 3) Nasomaxillary hypoplasia associated with cleft palate
- 4) Nasomaxillary hypoplasia associated with pan facial problems.

Nasomaxillary hypoplasia involving the dentoalveolar segment

This is characterized by recession of the nasal bridge producing a short nose, upturned nose or a recessed nose at the tip. The whole nasal skeleton is insufficiently projected forwards. Hypoplasia of the infraorbital rim and adjacent bone leading to increased inferior scleral exposure. The occlusion is abnormal.

Nasomaxillary hypoplasia excluding the dentoalveolar segment

Also known, as Binders syndrome .it is very similar to type 1 Nasomaxillary hypoplasia

Address for correspondence:

Preethi Bhat

Pranava, 2A, 50/51, 9th Main, 14th cross,
BTM 2nd stage, Bangalore, India.

Ph: +91 9845884598

E-mail: preeti_bht@yahoo.com

except that the dentoalveolar segment is normally related to the cranial base.

Nasomaxillary hypoplasia associated with cleft palate

This is the commonest condition where lefort 2 osteotomy is indicated. Vertical maxillary deficiency is an almost constant feature of all cleft lip and palate cases. In addition to clefting and dentoalveolar collapse, recession of the nasal base and hypoplasia of the adjacent maxillary area is also seen.

Nasomaxillary hypoplasia associated with panfacial problem

This is a heterogeneous group, which exhibits a degree of nasomaxillary hypoplasia in association with other skeletal disproportions, most commonly mandibular protrusion or progenia or both. The combined defect produces an unsightly 'sloping face' deformity, which can be adequately corrected usually by bimaxillary jaw correction.

Case report

A twenty-year-old Malaysian female presented with a chief complaint of having a

Fig. 1 Pyramidal LeFort-2 osteotomy proposed by Converse et al. [1]

Fig. 2 Preoperative frontal view

Fig. 3 Preoperative profile view

Fig. 4 Preoperative occlusion

Fig. 5 Paranasal skin incision

Fig. 6 Intraoperative photograph showing plating

Fig. 7 Intraoperative photograph showing plating

Fig. 8 Postoperative frontal view

Fig. 9 Postoperative profile view

‘large lower jaw’ (Figs. 2 and 3). Orthodontic consultation was sought and orthodontic-surgical correction was suggested for her problem. The patient refused to wear ‘braces’ and wanted the problem to be corrected at the earliest. Even after thorough counseling, she wanted her problem to be corrected by surgery alone. She had previously undergone root canal therapy for upper right second molar and also some teeth were restored with silver amalgam. Her father had the same kind of jaw. She had no systemic illness. No other relevant history was present. After thorough clinical and radiographic evaluation the following problem areas were identified.

Aesthetic problem

Frontal (Fig. 2): Infraorbital and paranasal deficiency, decreased nasal projection and retruded nasal anatomy.

Profile (Fig. 3): Anteroposterior maxillary deficiency, concave facial profile, mandibular prognathism, acute nasolabial angle.

Occlusal analysis (Fig. 4): Missing lower right first molar, Class III molar relation on left side, bilateral class III canine relation, anterior crossbite and posterior crossbite, lower dental midline shift-2mm to the left.

Cephalometric findings confirmed the clinical findings (Table 1). There was very mild mandibular excess and progenia. A diagnosis of nasomaxillary hypoplasia associated with panfacial problem (sloping face syndrome) was made. It was decided to perform a classic lefort 2 advancement followed by reduction genioplasty as a secondary procedure. After model surgery an advancement of 6mm was obtained and the splint was fabricated.

The surgical procedure we followed was similar to the procedure described by

Henderson [3,4,6]. The surgery was carried out under general anesthesia with a degree of hypotension, nasal endotracheal intubation was used. Surgical access was obtained via an intraoral mucogingival incision from first molar to canine bilaterally. Paranasal skin incisions were made to allow access to the medial orbital floor and the nasal bridge (Fig. 5). These leave inconspicuous scars if they are kept straight and follow the direction of the skin crease. The dissection is sub-periosteal. Care is taken not to damage the lacrimal apparatus or detach the medial canthal ligaments. Within the orbits Osteotomies are started with the orbital rim being cut vertically between the nasolacrimal duct and the infraorbital nerve. This is best done via the skin incision. The cut is then continued via the intraoral incision towards the posterior maxilla as for a le-fort 1 osteotomy. The cut then progresses across

Fig. 10 Postoperative occlusion

Fig. 11 Preoperative cephalometric radiograph

Fig. 12 Postoperative cephalometric radiograph

Fig. 13 Postoperative radiograph showing miniplates

Fig. 14 Osteotomy lines of Classic LeFort 2 procedure

the medial corner of the orbital floor posterior to the lacrimal apparatus. It is continued vertically until just about the level of insertion of the medial canthus where it is directed horizontally across the nasal bones. The same osteotomies are made on the opposite side and then connected. The nasal septum is then divided from above using one of the canthal incisions. Maxillary separation is carried

out with Tessier osteotome and mobilized with Rowe's disimpaction forceps. Care should be taken to ensure that spicules of bone do not damage the nasolacrimal apparatus during mobilization. The patient is put on intermaxillary fixation using acrylic wafer made during model surgery. Once the desired position is achieved, the osteotomy sites are fixed with miniplates (Fig. 6 and 7). Forced duction tests are performed on both globes. IMF is removed, occlusion is checked. The wound is closed in layers. The patient was very much satisfied with her postoperative appearance and did not want to undergo genioplasty (Fig. 8, 9 and 10) (Table 2). Preoperative and postoperative lateral cephalometric radiographs (Fig. 11 and 12) and radiograph showing plating is included (Fig 13).

Discussion

The case presented in this paper, nasomaxillary hypoplasia complicating other facial disharmonies is characterized by recession of nasal base producing a short nose. The whole nasal skeleton is insufficiently projected forwards. The occlusion is abnormal due to the underdevelopment of skeletal base. The labial plate is thinned over incisor roots.

The anterior nasal spine is deficient. The mandible shows a mild symmetrical

Table 1 Cephalometric measurements

Steiner's analysis	Degrees
SNA	76
SNB	86
ANB	10
COGS analysis	
N-A	-8 (-2.0+/-3.7)
N-B	+8 (-6.9+/-4.3)
N-Pg	+10 (-6.5+/-5.1)
MP-HP	33
Interincisal angle	112

Table 2 Comparison of pre and postoperative values

	Preoperative	Postoperative
Facial convexity	-12	-5
SNA	76	84
ANB	10	2
∠to A-Po	38	25

enlargement magnified by the maxillary defect giving rise to forward slope of the face ‘the sloping face syndrome’[5]. It can either be treated by Lefort 1, Lefort 2 or Lefort 3 based on the severity of the problem. The most commonly suggested operation for this condition is the classic Lefort 2 osteotomy. The original classic Lefort 2 procedure is very rarely performed by oral and maxillofacial surgeons as most of the mid face deficient patients require more lateral infraorbital rim and zygoma augmentation. Hence most of the time quadrangular Lefort 2 is the preferred procedure [7]. But as our case did not require advancement at the lateral, infraorbital rim and zygoma augmentation, it was decided to perform a classic Lefort 2 procedure. This operation is probably more stable than Lefort 1 for the correction of nasomaxillary hypoplasia. The basic line of osteotomy closely resembles that of the Lefort 2 fracture pattern (Fig. 14). It results in the mobilization of the true maxilla and the nasal bone which can be advanced tilted or rotated. At the same time the associated soft tissues and the nasal skeleton can be displaced in a controlled manner. It includes the frontal process of the maxilla to the maxillary-frontal suture, the nasal bone to the nasofrontal suture, the total nasal-cartilaginous complex and the infraorbital rim medial to the infraorbital nerve. It may also include a portion of the lacrimal bone. It contains all of the cartilaginous septum

and a major portion of the vomer. It has the advantages like nasal tip is advanced by 2/3 of the total maxillary movement, increased infraorbital projection, balanced contour of cheeks and para alar regions. But like every other procedure it has its share of complications like, disturbance in lacrimation, ectropion, infraorbital nerve paresthesia. It does not allow for the shortening of maxilla and gross occlusal corrections are not possible. It also requires skin incision.

Conclusion

Nasomaxillary hypoplasia clinically presents as a class III deformity with hypoplasia or retrusion of the nasal bones and maxilla, which manifests as deficient projection of the nose. Classic Lefort 2 osteotomy though introduced in 1950s, did not get its due attention till Henderson and Jackson published their landmark article, for the correction of Nasomaxillary hypoplasia in 1973. Accomplished surgeons can achieve a lot more in this rarely performed surgery when used in appropriate cases.

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