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Short communication

Modification of LeFort I osteotomy for severe maxillary vertical excess asymmetry

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Abstract

A superfluous maxillary alveolus exacerbates excess of the vertical maxilla, and leads to a severe form of deformity. This poses a unique surgical challenge. In such conditions, the dimensions of the maxilla cephalad to the anterior nasal spine are normal, which limits superior repositioning of the maxilla when done in a conventional manner. The objective of this paper is to highlight the importance of a modified approach to this deformity using a subnasal maxillary osteotomy. Advantages of subspinal maxillary osteotomy include the reduction of maxillary alveolar excess and increase in the scope for maxillary impaction.

Keywords: Le Fort I osteotomy; sub-nasal osteotomy; vertical maxillary excess

Introduction

After the first description of Le Fort fractures in 1900, the possibility of maxillary osteotomies allowed for more ways to treat severe dentoskeletal malocclusions. Le Fort I osteotomy remains the workhorse of orthognathic procedures, and its modifications reflect a strong tendency to control the movement of the maxilla in all three dimensions. However, the surrounding anatomical structures, particularly the superiorly-located infraorbital vessels and orbit, can sometimes limit the osteotomy cuts for the superior repositioning of the maxilla in cases of severe vertical maxillary excess. The maximum limit of maxillary impaction by conventional Le Fort I osteotomy is 4-6 mm. Also, the management of undesirable changes in the soft tissues postoperatively can challenge the surgeon enormously, and decrease the satisfaction of the patient.

The purpose of this paper is to report a case and to show the advantages of the modification of the conventional Le Fort I osteotomy technique for management of severe vertical maxillary excess.

Case report

An 18-year old woman with Marfan syndrome presented to our craniofacial unit, with the chief complaint of irregularly-placed teeth, which meant that she could not close her mouth or chew properly.

The clinical and cephalometric radiographic analysis confirmed an Angle Class III malocclusion with a Class II hyperdivergent skeletal base, which we decompensated for preoperatively by levelling and aligning the teeth.

Before operation, the width of the alar base was 34 mm. Based on clinical and cephalometric analysis, we planned the treatment, which included the placement of the modified subnasal Le Fort I osteotomy cuts, nasal intubation, differential maxillary repositioning (by 8 mm on the right side and 5 mm on the left side), and autorotation of the mandible.

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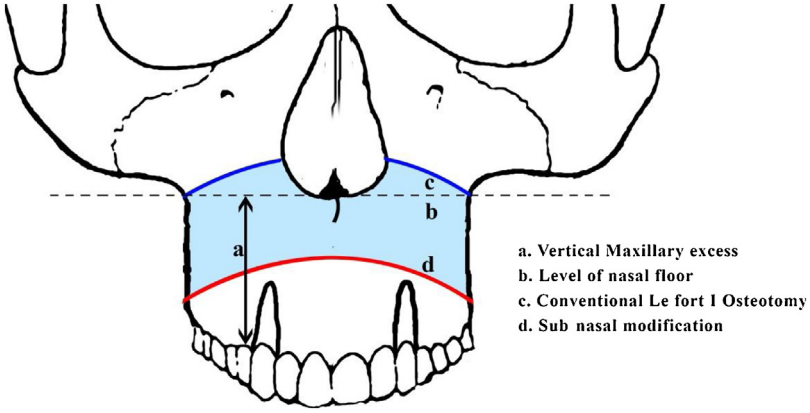

Fig. 1. Diagram showing the markings of the subnasal modified Le Fort I osteotomy.

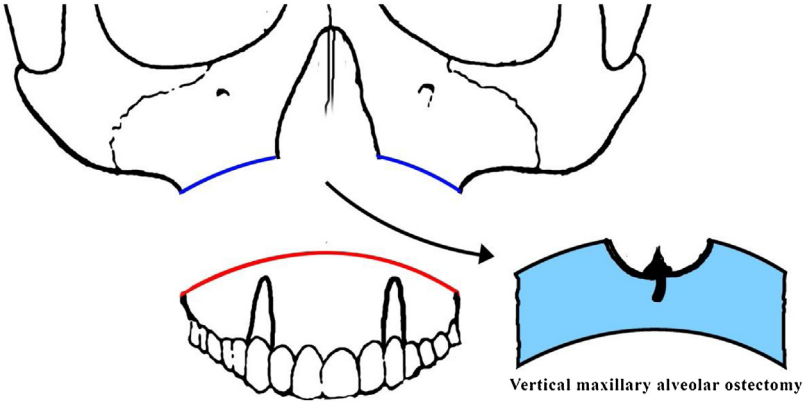

Fig. 2. Diagram showing the vertical maxillary alveolar ostectomy.

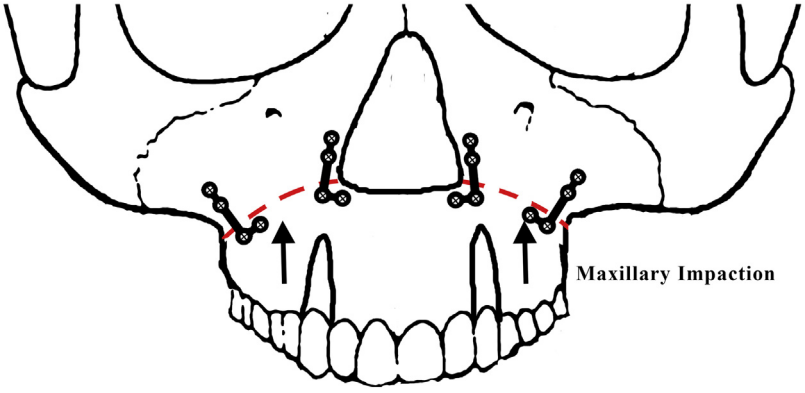

Fig. 3. Diagram showing the final position after maxillary impaction.

In this patient, instead of terminating the inferior osteotomy cut in the region of the piriform aperture, we decided to extend it below the base of the piriform aperture to include the anterior nasal spine of the maxilla. We used alar cinch sutures and pyriformoplasty to secure the septum to the anterior nasal spine.

First, we marked where the conventional Le Fort I osteotomy would have been, measured the vertical excess, and then marked the lower osteotomy cut in a downward direction (subnasal and above the apices of the canine about 3-5 mm). We did the lower, subnasal, cut before the upper one, then downfractured the posterior part of the maxilla, and removed the posterior vertical excess under direct vision.

The remaining steps were completed in the manner of a conventional Le Fort I technique, using standard rigid internal fixation at the zygomaticomaxillary buttress and piriform region to stabilise the maxilla in the planned position.

There were no complications related to resistance in the nasal airway postoperatively, so we completed the active orthodontic treatment to close the remaining spaces of the

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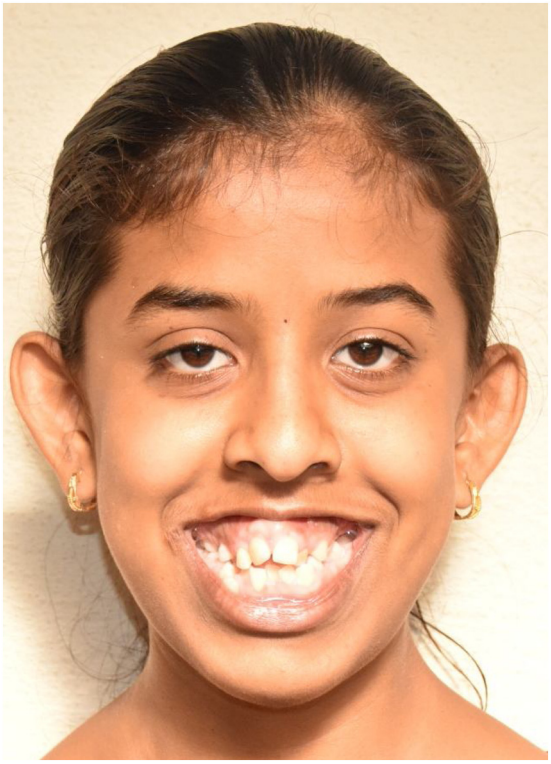

Fig. 4. Photograph of the extraoral frontal smile before treatment (published with the patient's permission).

Fig. 5. Photograph of the extraoral frontal smile after treatment (published with the patient's permission).

occlusion and refine the intercuspation fully. Follow up after one year showed that the width of the alar base was 36 mm compared with the preoperative measurement of 34 mm (Figs. 1–5).

Discussion

Vertical maxillary excess is a skeletal anomaly of the face that results from an overgrowth of maxillary bone, which causes an enlarged vertical dimension of the midface and the appearance of a short lip. Garber and Salama proposed that orthognathic surgery is indicated for more than 4 mm of gingival display in vertical maxillary excess.[1]

To the best of our knowledge, few modifications for lateral maxillary cuts in Le Fort I osteotomy have been reported. However, those that are, are designed to terminate inferiorly in the region of the piriform aperture, which limits the amount of bone available for resection during the superior repositioning of the maxilla. One of these modifications was described by Mommaerts et al[2] who referred to total maxillary osteotomy as "subspinal". The technique was originally described to avoid undesirable changes in the soft tissues by reducing the increase in the width of the interalar rim secondary to the anterior repositioning of the maxilla.

In our patient, the modification was planned bearing in mind the need for excess superior repositioning and the correction of maxillary cant without causing undesirable changes in the soft tissues. In contrast to the conventional Le Fort I technique, the incision must be V-shaped under the piriform aperture to avoid the detachment of insertions of the perirhinal muscles, and to prevent increase in the interalar width postoperatively. The inferior osteotomy cut is placed directly at the base of the piriform aperture, including the anterior nasal spine of the maxilla. This allows for the extra amount of bone to be available for resection at the inferior surface (instead of removing bone from the superior aspect) and minimises damage to the infraorbital nerve.

Conflict of interest

We have no conflicts of interest.

Ethics statement/confirmation of patient's permission

Ethics approval was gained and the patient provided permission for use of the material included.

Acknowledgement

We thank Dr Niranjan Kumar and Dr Srinath Takur for their encouragement and the facilities provided.

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