



Case Report

Non-surgical pre-maxillary sculpting in an adult patient with bilateral cleft lip and palate: A case report

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ABSTRACT

The severity of a bilateral cleft of the lip and palate ranges from disfigurement to absolute facial handicap. A successful treatment outcome was achieved in an adult patient with cleft lip and palate who reported with an unesthetic appearance, difficulty in closing lips, and chewing and speaking due to a protruded as well as rotated pre-maxillary segment. The correction of this conspicuous deformity was approached through a complex range of movements, which included de-rotation, sliding, retraction, and intrusion. These techniques effectively sculpted the pre-maxillary segment without necessitating any surgical intervention.

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1. Introduction

In India, the average incidence of clefts of the lip and palate is 0.54 to 2.75 per live birth.¹ The population afflicted with clefts of the lip and palate presents with not only an aesthetic but also a functional handicap,² which, without any intervention, spells impending doom for the rest of their lives. Apart from the difficulties posed by unilateral cleft repair, treating bilateral cleft lip and palate presents a more noticeable and complex problem: the pre-maxillary segment, which, in conjunction with the prolabium devoid of muscle fibers³, when impacted by protrusion and rotation, intensifies the complications involved.

In an adult, any movement of the pre-maxillary segment is challenging and often necessitates surgical intervention. This case study describes a successfully treated 18-year-old patient who had a history of primary cleft lip and palate repair for bilateral lip and palate clefts. The patient's pre-maxillary segment was extruded, rotated, and prominent, and it was "molded" through a complex range of movements

that included intrusion, retraction, sliding, and de-rotation without the need for surgery.

2. Case Presentation Figure 1

An 18-year-old female patient with bilateral cleft lip and palate had a history of primary repair. Her chief concerns were difficulty in speaking and eating, an unesthetic appearance of the face, and an inability to close her lips. (Diagram 1) Based on a clinical examination, the patient had an oval face shape, a mesoprosopic facial type, hypoplastic and flattened alar cartilage, a short columella, and an upper lip scar from a primary surgical repaired cleft lip and palate. With a convex profile, the upper lip was redundant.

In contrast to the typical maxillary hypoplasia observed in individuals with cleft lip and palate, this patient exhibited a distinctive presentation—an anomalous Class II jaw-base relationship ($ANB = 8^\circ$), which stemmed from the forward projection of the pre-maxillary segment. (Table 1) (Figure 2)

There was an obvious disparity because the pre-maxillary segment was distorted, protruding, and considerably rotated. The maxillary lateral incisor on the right side and the canine showed a significant 14.5 mm

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Table 1: Cephalometric appraisal; pre- and post- treatment

	Pre-treatment	Post-treatment
SNA	85°	81°
SNB	77°	77°
ANB	8°	4°
UI-NA	31°;10mm	22°; 3mm
LI-NB	23°; 5mm	20°;2mm
INTERINCISAL ANGLE	120°	134°
MAXILLARY INCISOR TO NF	27mm	24mm
FMA	25°	25°

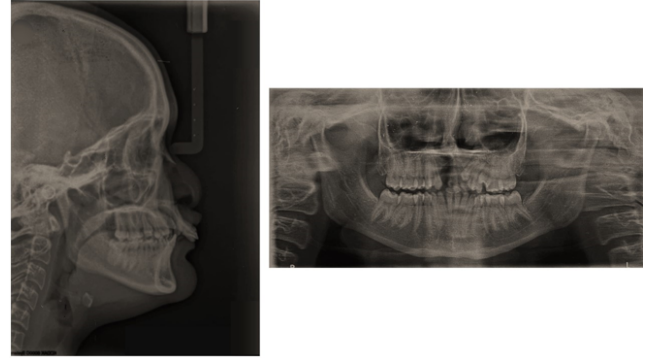


Figure 2: Pre- treatment radiographs

	PRE- TREATMENT	POST TREATMENT
RAA-X* (Right cleft gap)	14.5mm	0mm
LAA-Y (Left cleft gap)	1mm	0mm
a (Arch length)	50mm	35mm
b (Inter canine width)	26mm	30mm
c (Intermolar width)	34mm	34mm

Diagram 1: Pre- and post- treatment model analysis

*RAA: Right alveolar anterior; LAA: Left alveolar anterior,⁴ X: Distal most point on pre-maxilla on right-side; Y: Distal most point on pre-maxilla on left-side.

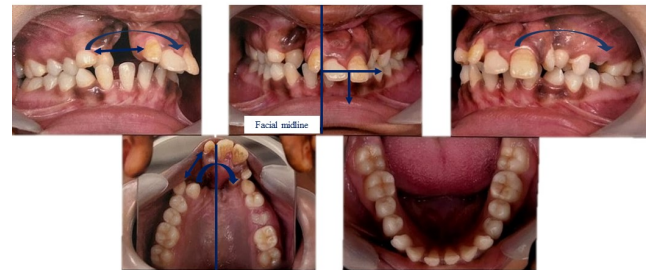


Figure 3: Pre-treatment discrepancy



Figure 1: Pre-treatment intraoral and extraoral photographs

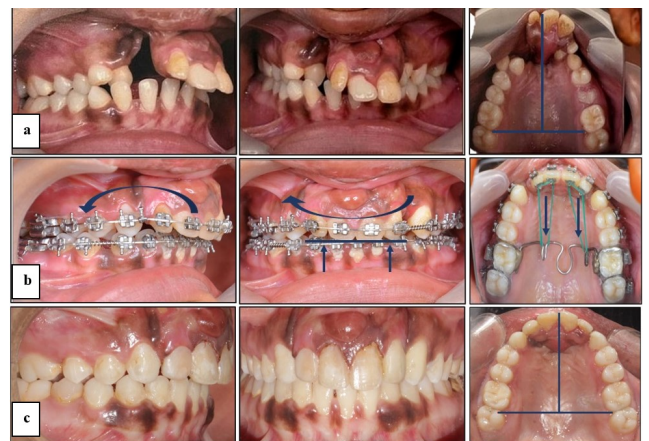


Figure 4: Treatment progress a. Pre-treatment, b. Treatment biomechanics c. Post-treatment

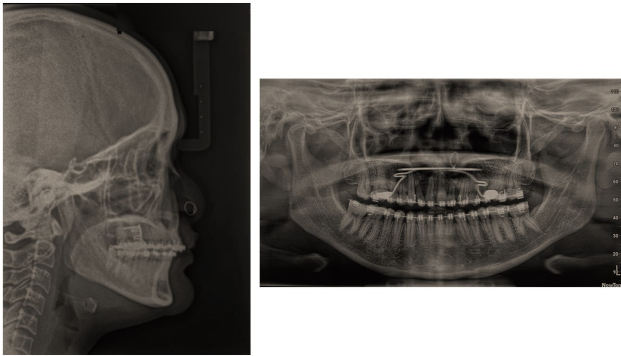


Figure 5: End of phase I radiographs

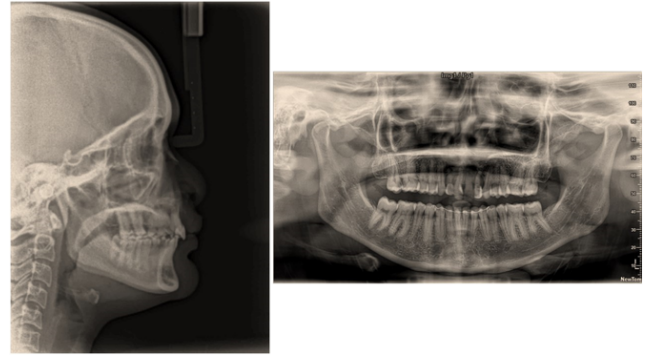


Figure 7: Post-treatment radiographs



Figure 6: Pre-treatment and post-treatment extraoral comparison

gap, whereas the left side showed a much smaller 1 mm gap. Class I molar relations were on the left, and Class II molar relations were on the right. The overjet was 16 mm, and the overbite was 90%. The midline of the maxillary dentition did not coincide with the midline of the face. There was over-retention of the upper deciduous canines and microdontia of maxillary lateral incisors. (Figure 3)

2.1. Treatment alternatives

Orthognathic surgery was initially considered as a treatment option because of the significant abnormality of the pre-maxillary region. The patient was fully informed about this alternative treatment plan, but because of psychological and financial difficulties, the patient declined any surgical intervention.

The second treatment option involved the possibility of utilizing non-surgical orthodontic camouflage to "mold" the pre-maxillary segment and permit its derotation, sliding, retraction, and intrusion. After careful consideration, the second plan was finalized. The final treatment plan was explained to the patient.

3. Treatment Objectives

The main goal was to contour the pre-maxillary region without requiring surgical intervention in order to address the patient's primary complaint of an unesthetic facial appearance. Treatment also aimed to achieve well aligned upper and lower arches, ideal overjet and overbite. In light of the considerable challenges presented by the patient's condition, our aim was to establish a functional occlusion, a priority that took precedence over the pursuit of an ideal normal occlusion.

3.1. Treatment progress (Figure 4)

This case was treated using 0.022" by 0.028" slot pre-adjusted edgewise appliances with MBT prescription.

3.2. Phase I (orthodontic treatment)

Derotation of pre-maxillary segment: The extraction of over-retained upper deciduous canines was followed by upper and lower arch strap up, beginning with 0.016-inch nickel-titanium (NiTi) for initial leveling and alignment of teeth and correction of rotation in relation to the upper left canine. Subsequently, the upper arch wire was replaced with a 0.016 A.J. Wilcock wire, followed by 0.017 x 0.025 NiTi.

Sliding of pre-maxillary segment: Upon transitioning to 0.017 x 0.025 Stainless Steel (SS) wire, the sliding and 'molding' of the pre-maxillary segment was facilitated by a 'push' type force by placing a coil spring between the lateral incisor and canine on the left and a 'pull' type force using an elastic chain between a crimpable hook, placed between the right lateral incisor and canine, and the first molar. This was achieved in 6 months.

Retraction and intrusion of the pre-maxillary segment: Beggs brackets were affixed to the palatal aspect of the upper incisors, serving as a palatal attachment connecting the incisors to the modified transpalatal arch (TPA) equipped with hooks. The retraction and intrusion were achieved in 8 months.

The premaxillary segment was successfully "molded" using the biomechanical techniques that were outlined earlier. With this method, the cleft was approximated, the upper midline was corrected, and lip competence was much improved. (Figure 5)

3.3. Phase II (prosthetic rehabilitation)

To address the micro-aesthetic concerns related to microdontia in the affected maxillary lateral incisors, composite buildup was done.

3.4. Treatment results

Results after treatment revealed a considerably better profile, more relaxed lip competency, and a more pleasing grin. (Figure 6) Additionally, 3mm and 31% were the values obtained for the overjet and overbite, respectively. Specifically, the pre-maxillary segment was sculpted, which resulted in a positive change in ANB from 8° to 4° and a notable improvement in overall facial harmony. (Table 1) (Figure 7) The gap was significantly reduced from 14.5 mm to 0 mm bilaterally as a consequence of the right side cleft gap being approximated successfully. (Diagram 1) The angle of the maxillary canines also showed improvement, from 31° and 10mm to 22° and 3mm. This alteration was supported by the decrease in the distance between the tip of the maxillary incisor and the palatal plane, which decreased from 27mm to 24mm. (Table 1)

4. Discussion

Most individuals with cleft lip and palate grapple with diminished self-esteem, stemming from frequently encountered challenges in the dentofacial region, including aesthetic, morphological, and functional issues.⁵

Adult patients with bilateral cleft lip and palate may present with special issues in regulating the protrusion of the premaxilla and excessive exposure of the incisors.⁶ In adults, these kinds of modifications are considered "unlikely," in contrast to younger people, when the pre-maxillary segment can be reshaped and corrected during

lip repair. A number of methods, including the use of extraoral traction, surgical setback of the premaxilla, and premaxillary excision, have been put forth to deal with this complicated problem. In cases when the pre-maxilla protrudes beyond 8-10mm relative to the lateral arch, cleft palate repair may be undertaken in combination with a surgical pre-maxillary retraction.⁷ Addressing bilateral cleft lip and palate presents an additional challenge in achieving alignment, necessitating the coordination of three distinct segments—the premaxilla and the left and right segments—to establish a harmonious arch shape and a functional occlusal table.

A 0.016 AJ Wilcock wire was used to support the dentition and facilitate the formation of an initial maxillary archform after the initial leveling, alignment, and rotation correction was achieved with a 0.016 NiTi wire. Subsequently, a 0.017x0.025NiTi rectangular wire was put in place. Simultaneous mechanotherapy was undertaken in mandibular arch as well.

Once the stainless steel wire reached the 0.017x0.025 stage, the premaxillary segment's "molding" came into focus. In order to slide and de-rotate the segment such that the maxillary midline coincided with the face midline, a coil spring between the maxillary left lateral incisor and canine and an elastic chain on the right pre-maxillary segment was carefully positioned. The palatal approach for bite opening, which was pioneered by the orthodontic pioneer Begg⁸, was used to Retract of anterior teeth in order to permit the palatal displacement of the pre maxillary segment with alveolar molding. This technique entailed the placement of a palatal attachment on the maxillary central and lateral incisors, which included a force component or elastic running between the attachment and the hooks of the modified transpalatal Arch (TPA).

The bilateral cleft gap was significantly reduced as a result of the pre-maxillary segment's derotation and retraction during "molding." The overjet and overbite were also corrected to their normal positions. The length of the arch reduced from 50mm to 35mm as a result of the pre-maxilla retraction. (Diagram 1). Once the detailing and finishing stages were complete, the fixed appliance was debonded.

Extraorally, this treatment approach enabled the patient to regain lip competency without any surgical intervention, with a reduction in incisal display and an improvement in functional efficiency, including better chewing and speech. To achieve optimal micro-aesthetics, prosthetic rehabilitation was performed on the microdontia-affected upper lateral incisors.

5. Conclusion

This case report presents an unconventional method of alveolar "molding" of a significantly rotated, deviated, and protrusive pre-maxillary segment. This technique

is typically employed in pediatric patients to achieve remarkable improvements in the pre-maxillary segment's alignment, where a surgical setback of the pre-maxillary segment would have normally been considered. The unconventional nature of the approach employed can be used as an alternative treatment option to surgical intervention in such cases.

6. Source of Funding

None.


7. Conflict of Interest

None.

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